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A STUDY OF FACTORS  
AFFECTING THE RETENTION OF  
CIVILIAN REGISTERED NURSES  
IN THE ARMY MEDICAL DEPARTMENT

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Submitted to the Faculty of  
Baylor University  
In Partial Fulfillment of the  
Requirements for the Degree  
of  
Master of Health Administration  
by  
Captain(P) Frank G. McDonald, III, AMSC  
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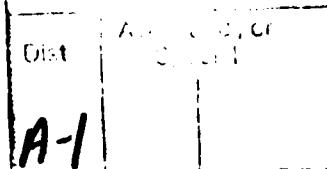
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## CHAPTER I

### INTRODUCTION

#### Development of the Problem

The problem of the acquisition and retention of the desired number of civilian registered nurses in the Army Medical Department (AMEDD) has recently accelerated to a critical state. Perhaps it is fortunate that the federal sector has been spared, until recently, the severity of the nursing shortage which has caused significant adjustments by those in the private sector. The delayed impact of the registered nurse shortage on the AMEDD has provided the competitors for this scarce resource a head start to plan and implement a strategy to address the problem. Furthermore, it appears that salary and benefit increases, flexibility in work schedules, re-definition of roles and other such adjustments in the civilian sector have been successful in curbing the problem precipitating the crunch now observed in the federal sector.

The severity of the shortage of civilian registered nurses in the AMEDD has been recognized by the Civilian Personnel Office (CPO) at Health Services Command (HSC) through input received by them from the field offices. Most post CPOs supporting HSC Medical Department Activities (MEDDAC) and Medical Centers (MEDCEN) have reported difficulty in filling registered nurse positions. To compete for the limited number of nurses available, supporting CPOs have requested changes in hire policies such as employment at less than full performance level, advanced in-hire rates and direct hire authority. Unfortunately, the laws and regulations

governing Civil Service personnel restrict the latitude of the medical treatment facilities, the supporting CPOs, and HSC to freely adjust to the market.<sup>1</sup>

Because of the constraints inherent in management of the civilian registered nurse, it would behoove the managers and policy makers to identify those factors currently affecting retention of civilian registered nurses in the AMEDD and anticipate trends for the future. This would enable the manager to take a proactive stance on the issue.

Information currently available to address the nurse shortage issue is limited. Although numerous studies have been conducted to isolate nurse retention factors, none have addressed the civilian registered nurse in the AMEDD. Direct application of the results from these studies of a different population to the AMEDD is questionable. Considerable data have been gleaned from exit interviews of resigning employees; however, this information is specific to the organization, is subjective, and, therefore, is suspect for use in determining overall policy. An objective data base specifically addressing the civilian registered nurse in the AMEDD is required for managers and policy makers to evaluate and anticipate trends in the total market. This will enable the appropriate individuals to address policy changes in an informed manner.

To this end a survey was conducted to analyze the impact of motivation and hygiene factors on retention. The survey was designed to identify those general motivation/hygiene variables that discriminate between those persons who stay and those who have turned over. The survey population was limited to studying AMEDD civilian registered nurses. Survey questions were designed to ultimately, through a multivariate analysis, generate information for application in a broad context (i.e., HSC-wide)

as opposed to application to specific medical treatment facilities. The respondents were limited to current employees or those that had declined or resigned within the previous six months of the survey (September 1981 to February 1982).

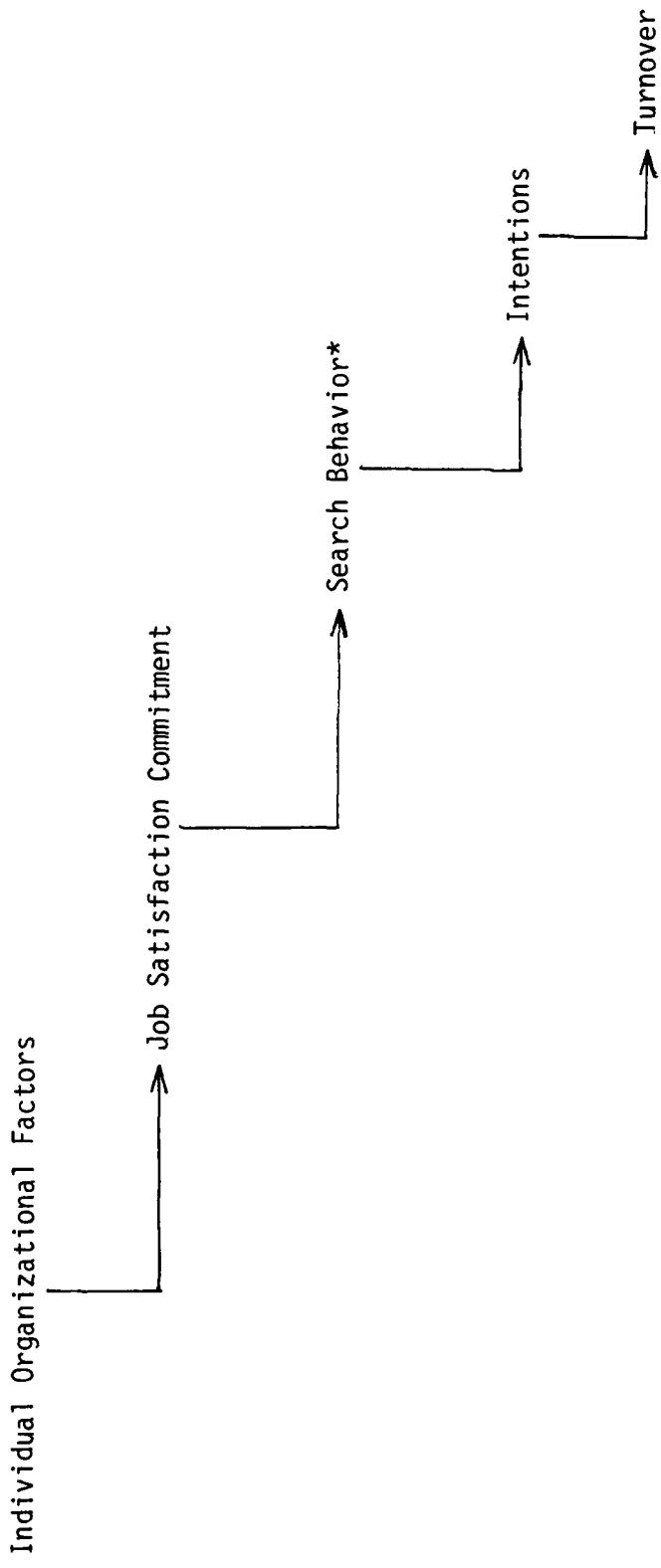
### Review of the Literature

#### The Employee Turnover Process

The literature describes voluntary employee turnover as a process as opposed to a single occurrence.<sup>2</sup> It is suggested that a causal chain exists beginning with individual and organizational factors which determine job satisfaction and commitment which determines intention ultimately ending in turnover (Figure 1-1). Michaels and Spector acknowledge the fact that their research fails to account for considerable variance in turnover and suggests the insertion of "search behavior" into the causal chain as an opportunity variable to explain this variance.<sup>3</sup> Mobley suggests the search behavior to be a precursor to the intent stage.<sup>4</sup>

Although a linear relationship is established by the causal chain models, one must acknowledge the systems context within which the process exists. The suprasystem is composed of at least the subsystems depicted in Mobley's comprehensive schematic of the primary variables affecting turnover (Figure 1-2). It is important to note that it is possible to have a change in any one or a number of these primary variables which have the potential to affect a change in the employee's position in the turnover process. In other words, positive influencing of a variable may result in a regression along the causal chain. A change in marital status may be cause alone to precipitate withdrawal from search behavior and indirectly promote commitment to the organization. Another example would be the realization that the "grass is not greener on the other side of

## EMPLOYEE TURNOVER CAUSAL CHAIN



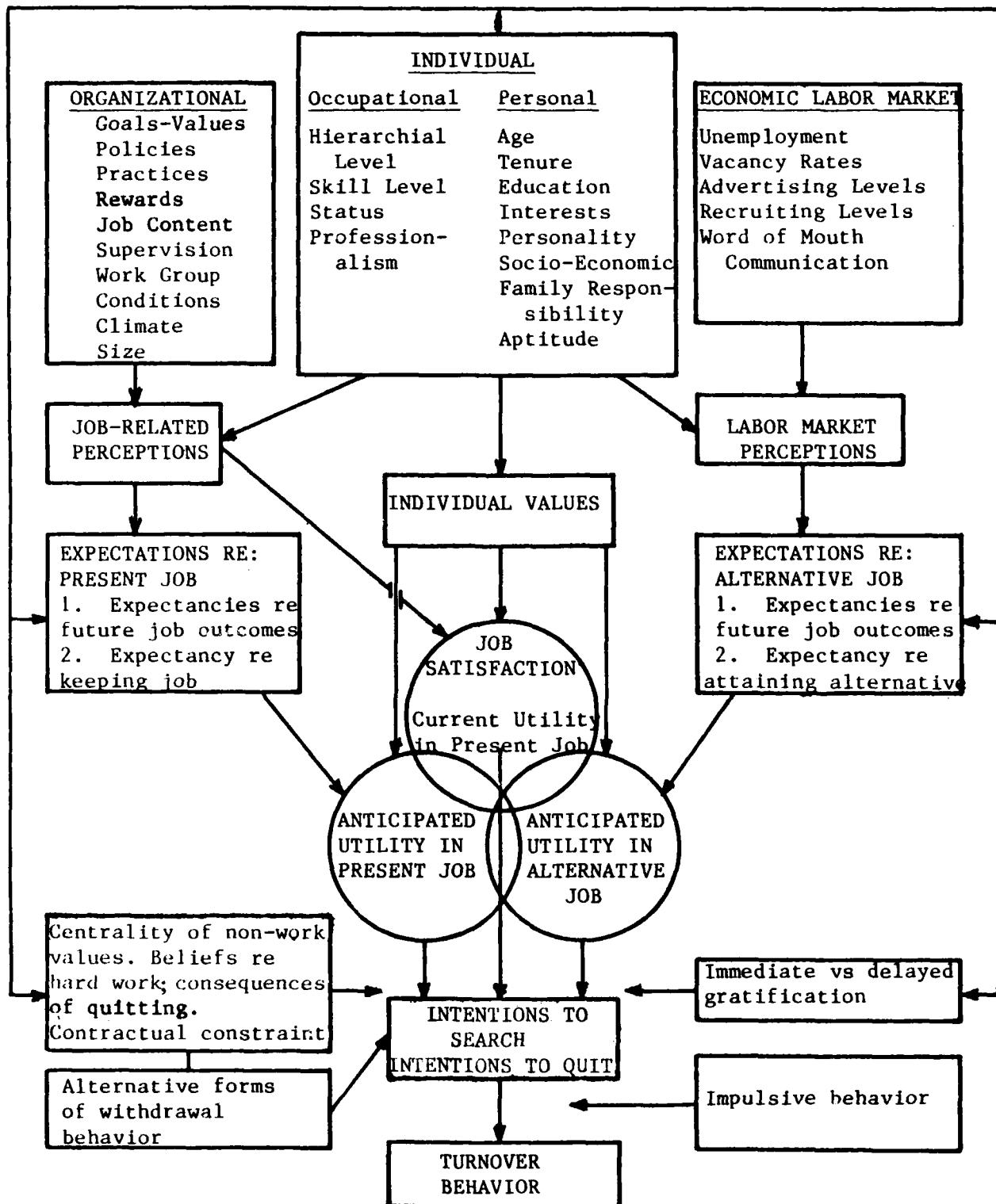
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\*Possible additional link which may account for large amount of variances in turnover

(Sources: Charles E. Michaels and Paul E. Spector, "Causes of Employee Turnover: A Test of the Mobley, Griffeth, Hand, and Meglino Model," Journal of Applied Psychology, Vol. 67, No. 1, p. 58; and William H. Mobley, "Intermediate Linkages in the Relationship between Job Satisfaction and Employee Turnover," Journal of Applied Psychology, Vol. 63, No. 2, 1977, pp. 237-240.)

Figure 1-1

# EMPLOYEE TURNOVER PROCESS



(Source: W. H. Mobley, et al., "Review and Conceptual Analysis of the Employee Turnover Process," Psychological Bulletin, 86, [March 1979]: 517.)

Figure 1-2

the fence." A distorted perception crushed by hard realities is often-times a deterrent to turnover.<sup>5</sup>

Just as important, one must realize that, as the employee progresses along the causal chain, there can be no course reversal unless significant changes occur in satisfaction or expected utilities. Hellriegel and White demonstrated that, in 60 percent of the turnovers in their study, significant increases in salary (greater than 20 percent) were useless in combating turnover once the worker progressed to the intent stage.<sup>6</sup>

Another essential ingredient to understanding the turnover process is that it is an individually manifested behavior. Although aggregate factors, such as the national unemployment level, are good predictors of turnover on the macro level, such factors are poor predictors in the micro sense.<sup>7</sup> In fact, the reason causing one employee to stay may be the very reason causing another to turnover.<sup>8</sup> However, one cannot discount the impact of aggregate factors on individual behavior.<sup>9</sup>

Although employee evaluation of job alternatives in the environment external to his present organization has not been documented, its impact on individual turnover has been included in Mobley's model.<sup>10</sup> Michaels and Spector were unable to confirm this relationship.<sup>11</sup>

The inverse relationship between job satisfaction and turnover is well documented.<sup>12</sup> Mobley is quick to point out, however, that consistently less than 14 percent of the variance in predicting turnover can be accounted for through overall job satisfaction.<sup>13</sup> As has been previously suggested, factors other than those directly affecting satisfaction with the immediate present job may account for considerable variance in explaining turnover. Mobley's model (Figure 1-2) suggests the joint contribution of job satisfaction (present utility), anticipated utility from the present job, and the attraction and attainability of alternatives.

The anticipated utility from present job may be considered as "sowing your seeds now for a later harvest" or as "paying your dues." The present immediate job may be a means to a more desirable position - a stepping stone. If it were not for the anticipated utility, a worker may not derive enough job satisfaction to prevent his turnover. Another employee, although not experiencing sufficient job satisfaction to prevent turnover in itself, may stay because of the future gains anticipated which are in some way associated with the present job. The anticipated utility may be either in the present organization or in an alternative organization.

Furthermore, the worker's perception of anticipated utility in an alternative job should contribute to explaining why one employee stays while another leaves. Anticipated utility in an alternative job is the availability and desirability of an alternative job and the worker's perception of the likelihood of acquiring the position and at what cost. This factor may have either a positive or a negative influence in that it can promote retention or turnover. If the employee associates no anticipated utility or disutility to alternative jobs, the employee may stay. If sufficient utility is associated with an alternative job, however, then the employee may become a turnover.

#### The Nursing Shortage

Whether or not a nursing shortage exists is dependent upon the perspective from which one considers the issue. The concepts presented in this section will be the basis of discussion in later sections. There are at least four generic contexts. First is the macro context or the existing number of registered nurses versus the number "required." Second, there is the number of vacant budgeted positions. Third is the

operational context (i.e., impact of the nurse supply on delivery of health care). Fourth, there is the turnover/fill rate. Each of these can be limitlessly dissected in any number of individual or combined ways. For example, one may wish to consider the number of vacant budgeted cardiac care unit positions on the evening shift in the Baptist hospital system in San Antonio, Texas.

Regardless of the specific context, in order to truly analyze the issue, one must take a systemic perspective. If the aggregate demand exceeds the aggregate supply, a shortage exists. The problem in establishing the aggregate supply is that workers have a propensity to migrate in and out of professions. This is particularly true for female-dominated fields. It has been reported, for example, that today's worker changes fields of employment (not just jobs) an average of three and one-half times during his work history.<sup>15</sup> It is also difficult to establish the demand for registered nurses. The number of vacant budgeted positions may or may not be an indicator of a registered nurse shortage. These positions may be vacant for other reasons. Also, a single hospital, district, state, or even region, may experience a condition which is atypical for the bulk of the industry. As will be addressed subsequently, adjustments oftentimes occur within a given industry or industries to accommodate to scarce resources in an effort to minimize adverse impact on operations. The role of the registered nurse may, in part, be assumed by other personnel such as ward clerks, LPNs, ancillary personnel, and others (homogeneous substitution). Again, the turnover/fill rate may or may not be indicative of the registered nurse supply. Personnel policies and procedures could account for this rate as well as available nurse prospects.

Perhaps a diagram can best demonstrate the wholistic relationship of these contexts. Figure 1-3 depicts an imbalance in the aggregate

registered nurse supply with the demand. The number required versus those available in Region A is equal. The same aggregate imbalance exists in Figure 1-4; however, an excess of cardiac care unit nurses is depicted. Figure 1-5 is an indifference curve demonstrating substitution of other health care workers for registered nurses. A relative decrease in registered nurses ( $A \rightarrow B$ ) is absorbed through a homogeneous substitution with an increase in other health care workers ( $C \rightarrow D$ ). Despite resistance by the nursing profession, many duties previously considered the registered nurse role are being assumed by more plentiful, less costly resources.<sup>16</sup>

As aforementioned, an adequacy of the nursing supply is a relative issue. In a climate of a true nursing shortage, it is possible to have the shortage experienced by all, or an adequate supply experienced by some, precipitating an even greater shortage to be experienced by the remainder of the health care industry.

#### SUPPLY/DEMAND BALANCE GEOGRAPHICALLY

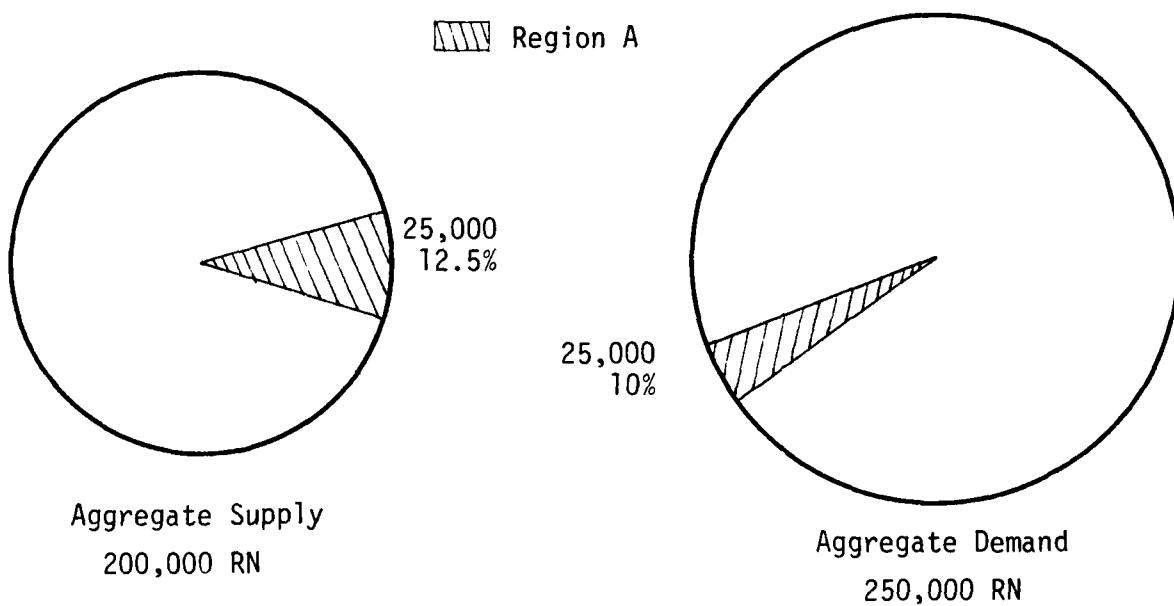


Figure 1-3

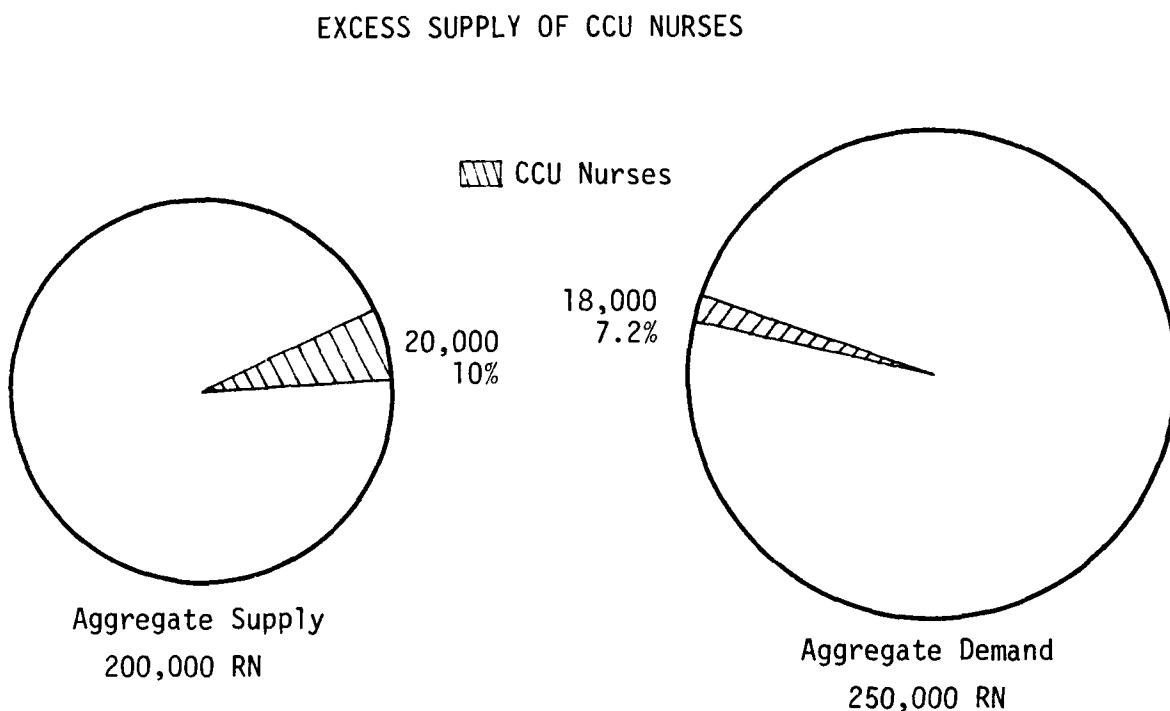


Figure 1-4

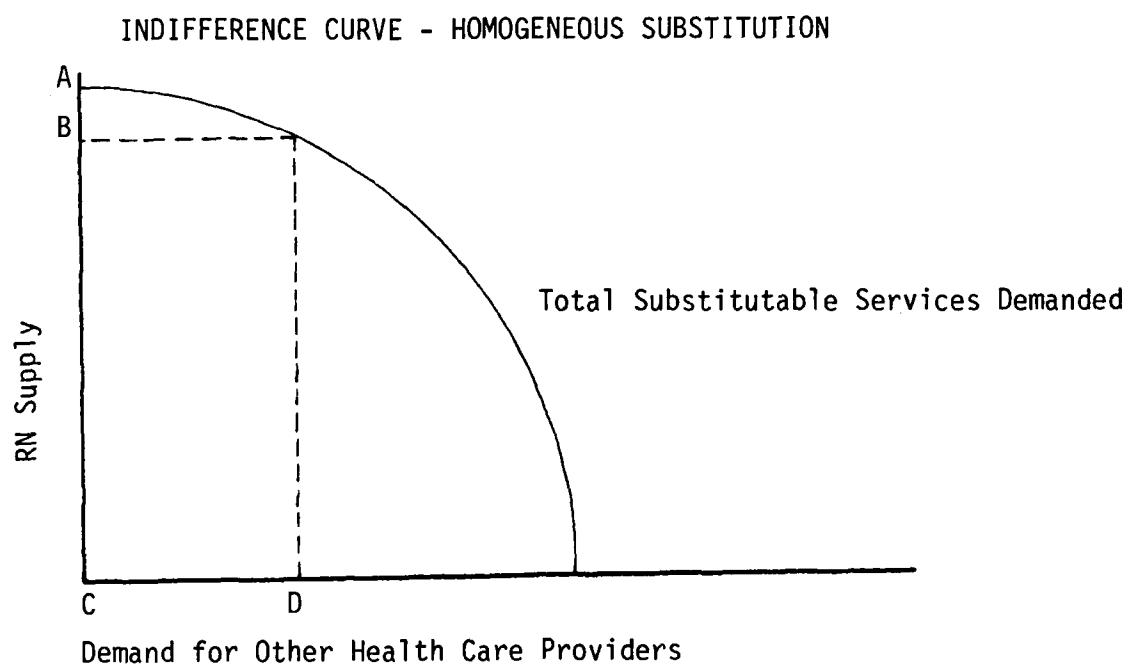


Figure 1-5

### The Crisis in Nursing

The health care industry is experiencing increasing difficulty in recruiting and retaining registered nurses. Despite aggressive efforts to overcome the situation, the number of vacant budgeted positions is escalating due to climbing turnover rates coupled with increasing full time. The situation has become so severe in some areas that the delivery of health care has been restrained. This closure of beds and intensive care units is a manifestation of a classic labor shortage. Goldsmith reports widespread turnover of 32 percent with 96 percent of hospitals surveyed experiencing difficulty filling full-time positions.<sup>17</sup> Texas registered nurse vacancies for January 1981 were 12 percent. Vacancies up to 3 percent are considered normal in commercial/industrial activities.<sup>18</sup> A national survey showed the health care industry was tied for first with the finance field in turnover rates.<sup>19</sup>

At the same time this shortage exists in the health care industry, the total number of past graduates from nursing programs exceeds the current demand; however, only 42 percent of the registered nurses in the United States are currently employed in nursing on a full-time basis. The remaining 58 percent work part-time in nursing, work in other areas, or have completely withdrawn from labor force participation.<sup>20</sup>

The recent literature abounds with articles suggesting reasons for the nursing shortage. These reasons can be classified into four basic categories: perceived utility derived versus the cost, professional issues, factors affecting overall job satisfaction, and external environmental issues.

A report prepared by a division of HHS in context of the enconomic model describes the indirect cause and effect relationship between wages

paid and the availability of registered nurses at the macro level.

Simply stated, a relative increase in wages will increase the number of entrants into nursing programs which will eventually increase the aggregate supply of nurses. Market forces - supply/demand and price theory - account for much of the variance in the number of entrants into the nursing profession. The relationship to economic theory is not always immediately evident. Because of the nonlinear causal linkages and time lags, the relationship becomes obscured.

An adjustment lag, the delay between a relative increase in wages and an increase in number of graduates, information-decision lags, and other factors account for this obscurity. An analysis at one period in time may not reveal a significant relationship, whereas a longitudinal study will show that a relative change in wages will affect the number of future nursing graduates.<sup>21</sup> Furthermore, the increased demand for registered nurses in response to the greater aggregate demand for health care as stimulated by the introduction of Medicare, Medicaid, and other third-party programs is an example of demand pull. This added demand for registered nurses precipitated an elevation in relative wages. The wage increase affects a change in the market place and creates a larger supply of nurses - not immediately, but at a later date. The competition for this now scarce resource promotes further escalation of wages and further increases the number of entrants to nursing schools. When an adequate supply of nurses is finally produced, the wages are moderated, but there is no significant change in quantity output of nursing schools because of the number of students already in the system. As a nurse surplus develops, wages are suppressed and the number of entrants to registered nurse schools diminishes.<sup>22</sup>

The cyclic activity is not unique to nursing. All professions are affected to some degree in a similar fashion. In contrast to profit maximizing firms, non-profit organizations fail to dispatch clear economic signals and goals, dampening the market reactions. The health care industry, because of its traditional non-profit orientation and growing external pressures for voluntary cost containment, attempts to absorb market pressures by holding down increases in nursing wages until the situation becomes severe. The market forces are not allowed to operate properly.<sup>23</sup> Thus, the cyclic response is precipitated.

Additionally, with the change in gender attitudes, there is greater competition for the pool of prospective nurses, women between the ages of eighteen and twenty-five. Individuals in this pool are no longer confined to the professional choice of nursing or teaching. Other job markets are vying for them. The concept of relative wages and the cost to enter the profession (time, money, and expected return) must be expanded to incorporate the whole gamut of available alternatives.

The National Commission on Nursing, a multidisciplinary body established in 1980 by the American Hospital Association, was charged to address current nursing related programs and implications for the future. The Commission reports a lack of agreement about nursing roles and functions. Inherent in this ambiguity is a lack of recognition for the contribution of nurses to patient care. Autonomy is another issue addressed by the Commission. There is an apparent need to define the role of health care workers so that each may carry out his/her duties independently, yet in a collaborative effort.<sup>24</sup> In an effort to promote independence, responsibility, and accountability, the primary nursing model and self governance has been adopted.<sup>25</sup> The expressed need for registered nurses

to have greater input into patient care and organizational operations reflects the personal and social transformation underway in our culture.<sup>26</sup> The scope of self determination has expanded far beyond direct patient care into many aspects of administration, management, and education. In addition to collaboration between medical doctors and registered nurses regarding individual patient care, nursing participation is being encouraged in areas such as fiscal planning, procurement actions, and in representation on all medical committees.<sup>27</sup>

Encouraging greater participation by nurses has negative as well as positive implications. In the positive vein, there is the potential for better opportunities to influence nurse satisfaction on the whole and to provide personal opportunities for achievement and advancement. On the other hand, the primary nursing model is nursing-intensive and the expansion of the registered nurse role into other than patient care areas will increase the shortage of nurses. Therefore, as Goldsmith suggests, a more acceptable approach would perhaps be abandonment of the pure form of primary nursing for modular nursing.<sup>28</sup> Furthermore, minimizing registered nurse involvement in non-patient care related activities and promoting mechanisms to facilitate intervention of factors to create a climate of greater job satisfaction for the nurse may be more desirable than utilizing the nurse in expanded roles.

The link between job satisfaction and nursing turnover has been well established.<sup>29</sup> The list of possible factors affecting registered nurses' job satisfaction is endless and, for the most part, mirrors that affecting workers universally. It is important to note, however, that because the majority of nurses are women, some of the more significant factors create a different mix. For example, availability of child care

facilities and personal security have been reported to account significantly to job satisfaction.<sup>30</sup> The job satisfaction variables most consistently reported in the literature affecting turnover are salary and rotating shift. Surveys conducted by the Staffing Branch, Civilian Personnel Office Division, Health Services Command, have encountered similar findings.<sup>31</sup>

External environmental factors are those not directly or indirectly inherent to the organization. For example, a nurse may be completely satisfied with her job; the pay, professional experience, and job satisfaction may all be sufficient to retain the worker. Yet, if the spouse relocates, it is likely the nurse will relocate also and terminate employment. This is a frequent occurrence with civilian nurses in the AMEDD who are married to military personnel. Another example is the overall state of the economy. Because of high unemployment conditions, the nurse may be inclined to strive for steady employment even if the nurse would terminate the job during improved economic conditions.

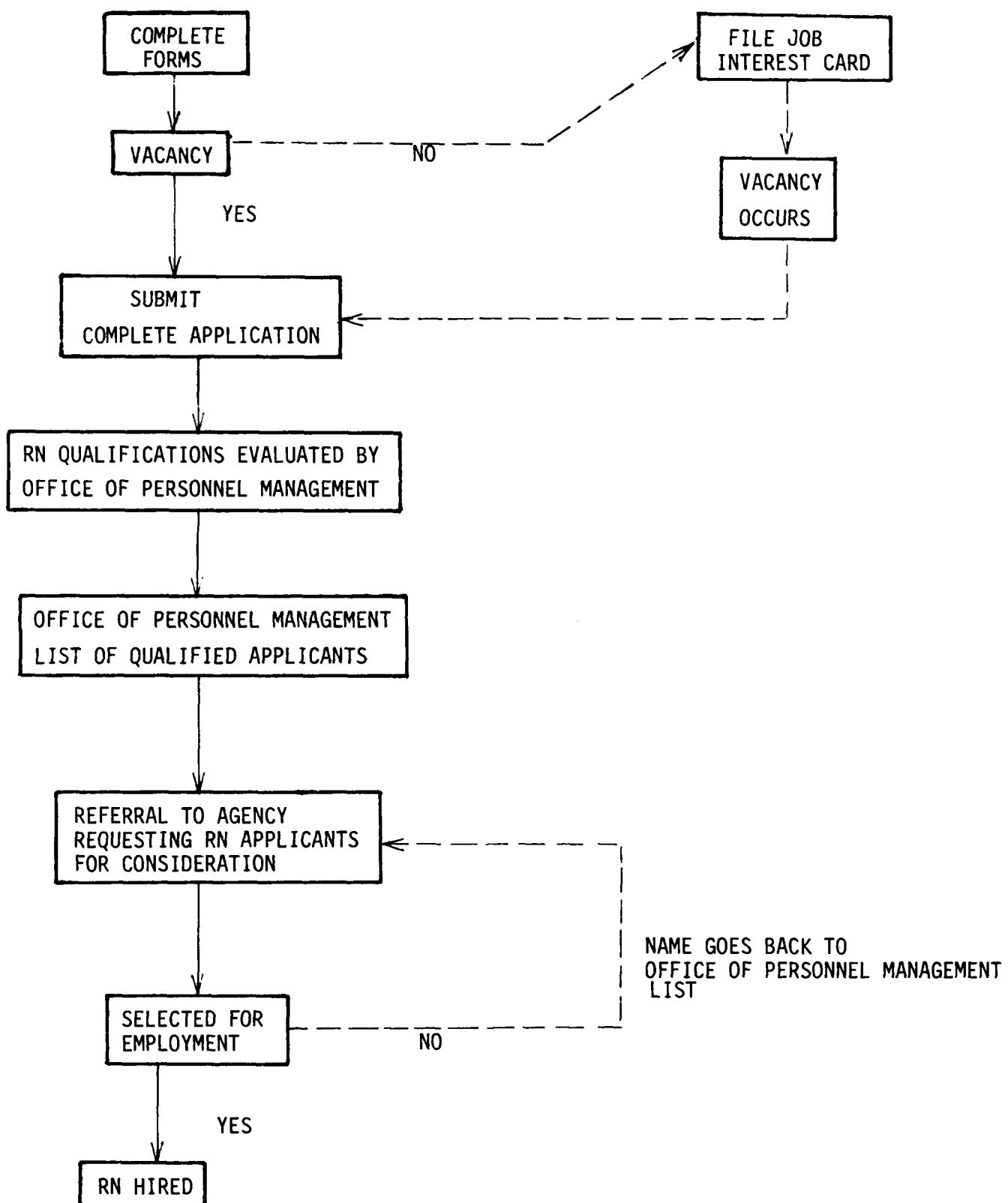
In summary, each of the four factors (perceived utility derived versus the cost, professional issues, factors affecting overall job satisfaction, and external environmental issues) has the potential to affect retention in the job, the organization, and the profession. As was noted during the discussion of the economic model and the turnover process, these factors must be considered not only in perspective of the nursing profession but also other fields of employment. If one recalls Mobley's model, turnover is based not only on present satisfaction but also on the future utility of the present job and utility of alternate positions.

#### AMEDD Civilian Registered Nurses

The total number of Army Nurse Corps (ANC) slots falls well short of the total registered nurses required to support the AMEDD mission. The Army Nurse Corps is augmented by civilian registered nurses hired through the Civil Service System. In order to gain employment in the Civil Service System, one must undergo a specified process (Figure 1-6). The Civil Service System policies and procedures are universal. With minor variations for specified exceptions, the policies and procedures are also standardized so that all federal civilians are treated equally during hiring and while on the job.<sup>32</sup> The hiring process for a registered nurse who is new to the Civil Service System takes about two months.<sup>33</sup> There are many opportunities to stretch out the time involved for hiring. A survey of selected servicing Civilian Personnel Offices (CPO) and Medical Activities (MEDDAC) revealed that the list of registered nurse vacancies was not properly maintained nor was the list of qualified applicants properly maintained.<sup>34</sup> Problems with these lists can completely block the hiring process. Even when the process works properly, the two-month hire lag is more than many prospective employees are willing to wait. Instead, they are immediately hired by competing health care organizations.

Several surveys have been conducted recently pertaining to AMEDD civilian registered nurses to determine management's perception of the shortage, what factors are affecting recruitment and retention, and to compare the system to the private sector.<sup>35</sup> Not until the spring of 1982 was the perception widespread that a nursing shortage existed in the federal sector. The situation became so severe at Letterman Army Medical Center, Presidio of San Francisco, California, that the ratio of civilian to Army Nurse Corps positions was changed to allow filling vacant positions

## CIVIL SERVICE HIRE PROCESS FOR RNs



(Source: US Civil Service Commission, Working for the USA (Washington, DC; US Government Printing Office, 1976), p. 11.)

Figure 1-6

with military nurses. Direct hire authority for registered nurses has been and is being pursued by several servicing Civilian Personnel Offices. Other efforts are being made to further cut the lag time for hire and to make the positions more attractive for recruitment. Many of the areas of worker dissatisfaction reported by the surveys parallel the private sector. Specific to the federal sector is the dichotomy of the military nurse and the civilian nurse. The perception, and oftentimes the reality, is that there is a double standard. In contrast to the Army Nurse Corps, the civilian nurse has no opportunity for advancement and limited growth opportunities.

Any really significant change to the policies and procedures literally requires an act of Congress. Since the system is universally applicable except for minor exceptions, it is inherently difficult to adequately respond to specific needs of individual organizations. The system is relatively conservative and offers stability; however, the required responsiveness to the current nursing situation may be lacking. The private sector has made use of its flexibility and inventiveness to minimize dissatisfaction and maximize satisfaction. Until recently, the Civil Service pay scale and benefits were universally competitive to those offered by civilian facilities. This is no longer the situation.

#### The Future Environment

Through a review of the literature pertaining to the nursing situation, one develops a perspective of instability. Pressure from numerous forces, internal and external to the profession, are causing change. It is important to anticipate the impact of these forces. Only through this anticipation can the manager be proactive in managing those resources

under his control and accommodate to those he cannot control. These forces will be discussed in context of a supply/demand model.

One can expect a decrease in the relative input of individuals into the nursing profession. The Texas State Board of Nurse Examiners reported a 16.9 percent drop in nurse enrollment from 1977 to 1979. The Board continues to report that this trend is representative nationwide.<sup>36</sup> The decline in the entry into nursing is related to numerous factors previously addressed in the discussion on utility. At the 1982 American College of Hospital Administrators Congress, representatives of the National Commission on Nursing firmly announced their support of the baccalaureate degree as the minimum entry into the profession of nursing.<sup>37</sup> This, of course, would eliminate entry via two other current modes: diploma and associate programs. The impact of the Commission's recommendation may be voided in that the American Hospital Association's General Council, after receiving the Commission's initial report, continues to support maintenance of all three entries. If the recommendation is enacted, however, the cost to enter nursing would greatly increase in terms of money and time. The economic model suggests this would require a substantial increase in wages and benefits to offset the increased "initial investment" cost.

Further understanding of the future may be achieved by projecting the impact of future United States economic policy and its impact on the health care arena, particularly the allocation of resources. There will be a concerted effort to redirect resources from consumption into investment. In this context, health care expenditures are considered a form of consumption. This effort will deter the aggregate growth of health care incomes. This implies that most segments of health care industry

workers will not have significant wage increases. The change in income per physician will reflect the change across the health care industry; however, with the anticipated growth in the number of physicians over the next two decades, there will be an increase in their portion of the industry total of resources consumed.<sup>38</sup> Furthermore, continued government support in other areas such as the Nurse Training Act is not likely. This government support has previously been a strong inducement to attract potential nurses.<sup>39</sup>

Other reasons for the decline in entrants to nursing are the closure of nurse training programs associated with hospitals, the decrease in the pool of persons from which to draw, an increase in competition for these persons by other occupations, and increasing pressure to restrain increased costs in the health care industry. Although baccalaureate programs continue to grow in numbers, the hospital-based diploma programs diminish because of increasing cost containment pressures.<sup>40</sup> The pool of potential entrants, aged eighteen to twenty-five years, has begun to stabilize and will decline since the United States birth rate peaked in 1960.<sup>41</sup> Though the nurse profession has been, and may continue to be, enticing to many, women now have greater occupational choice than ever. Other occupations now available will draw significantly from this manpower pool in the future.

The negative impact of a decrease in the number of entrants to nursing will be reinforced through a decrease in the retention of those already in the profession. Every occupation experiences a trickle of individuals leaving for another occupation, limiting their work to part time, or leaving the work force entirely. Because many of the same factors aforementioned are projected to curb future initial entry, this trickle may evolve into a steady stream. Dissatisfaction with inflexible schedules and rotating shifts, weekend duty, low salary, professional

unfulfillment, conflicts with personal goals and family roles, and the attractiveness of alternatives are but a few of the variables with the potential to accelerate turnover.

The nurse manpower shortage has brought back into the profession many former nurses. The current registered nurse work force has a greater number who are married and who have children. Commitment to the organization and the profession may not be as high as it once was. One must recognize that some nurses work because of the motivation of a strong commitment to the profession; however, there are others who are motivated to work to support their strongest commitments which are elsewhere. This is not intended to imply that primary commitment denotes one who will contribute the most. On the contrary, because of the commitment elsewhere, that worker could be motivated to perform to maximum potential. The point is that this type of worker could become a turnover to the organization or profession more easily. Flowers and Hughes discuss this issue in depth.<sup>42</sup>

The previously mentioned inherent working conditions in the nurse profession are not conducive to satisfying the needs of those with a commitment to family. Unless there is a major effort to accommodate to the needs of this segment of the registered nurse population, there will be an exodus to more accommodating occupations.

Associated with the projected increase in the number of physicians, there may be a shrinkage in the nurse's role. During the recent period of a physician shortage, nurses and other health care professionals expanded their roles to fill the void in the demand for health care. Through this expansion evolved the nurse clinician and the nurse practitioner along with physician assistants and others. In specialty care

units (e.g., intensive care and cardiac care units) nurses have assimilated which were once considered non-traditional roles. Accepting the limitations on expansion of resources devoted to the health care industry and coupled with the growing number of physicians, one must expect many of these former physician functions to be usurped by physicians along with the monetary and non-monetary benefits. Undoubtedly, this will result in great dissatisfaction by many registered nurses currently in these positions and for those who would aspire to such. Rather than becoming a part of the general nurse pool, there is the chance that many of these individuals will leave nursing altogether. With the projected increased demand for home health care, outpatient care, and hospital care in the 1980s, it is apparent that there will be competition for registered nurses within the health care industry. Those positions meeting the nurses' needs will be filled drawing from the registered nurse pool to the regret of the remainder of the health care industry.

The supply of nurses, currently and for the future, is bleak. The discussion will now address the future demand for registered nurses. The Commission on Nursing predicts an increase in the demand for nursing care. This will be precipitated from increasing numbers of elderly persons, an increase in incidence of chronic diseases, further expansion in technology and information, an increase in specialized health care, and new types of family units.<sup>43</sup> Again, the impact of greater numbers of physicians can be anticipated. Greater numbers of physicians in itself will generate added demand for nursing and ancillary support services.<sup>44</sup> In summary, ceteris paribus, the supply of registered nurses appears to be, and will continue to be in the foreseeable future, significantly short of demand.

Research Design

As noted in the review of the literature, numerous recent studies have been conducted to explain the variance in employee behavior with regard to turnover in the nursing profession. Although the similarities between the factors affecting turnover of AMEDD civilian registered nurses and other registered nurses are great, there are significant differences in work situations. There have been no multivariate studies of the AMEDD civilian registered nurses from the perspective of the nurse. The survey subsequently described is such a study. Figure 1-7 shows the steps in the research design. After reviewing the literature on the turnover process, the model which seemed to be the most appropriate was selected on which to base the survey instrument. To verify the general relationship and any grossly obvious differences between factors affecting turnover in the general registered nurse population and this target population segment, personal interviews were conducted with nurses and health care managers. Based on these interviews and the literature review, a questionnaire was developed. Distribution of the survey encompassed nearly all Health Services Command activities. The multivariate analysis was accomplished through discriminant analysis.

STEPS IN RESEARCH DESIGN

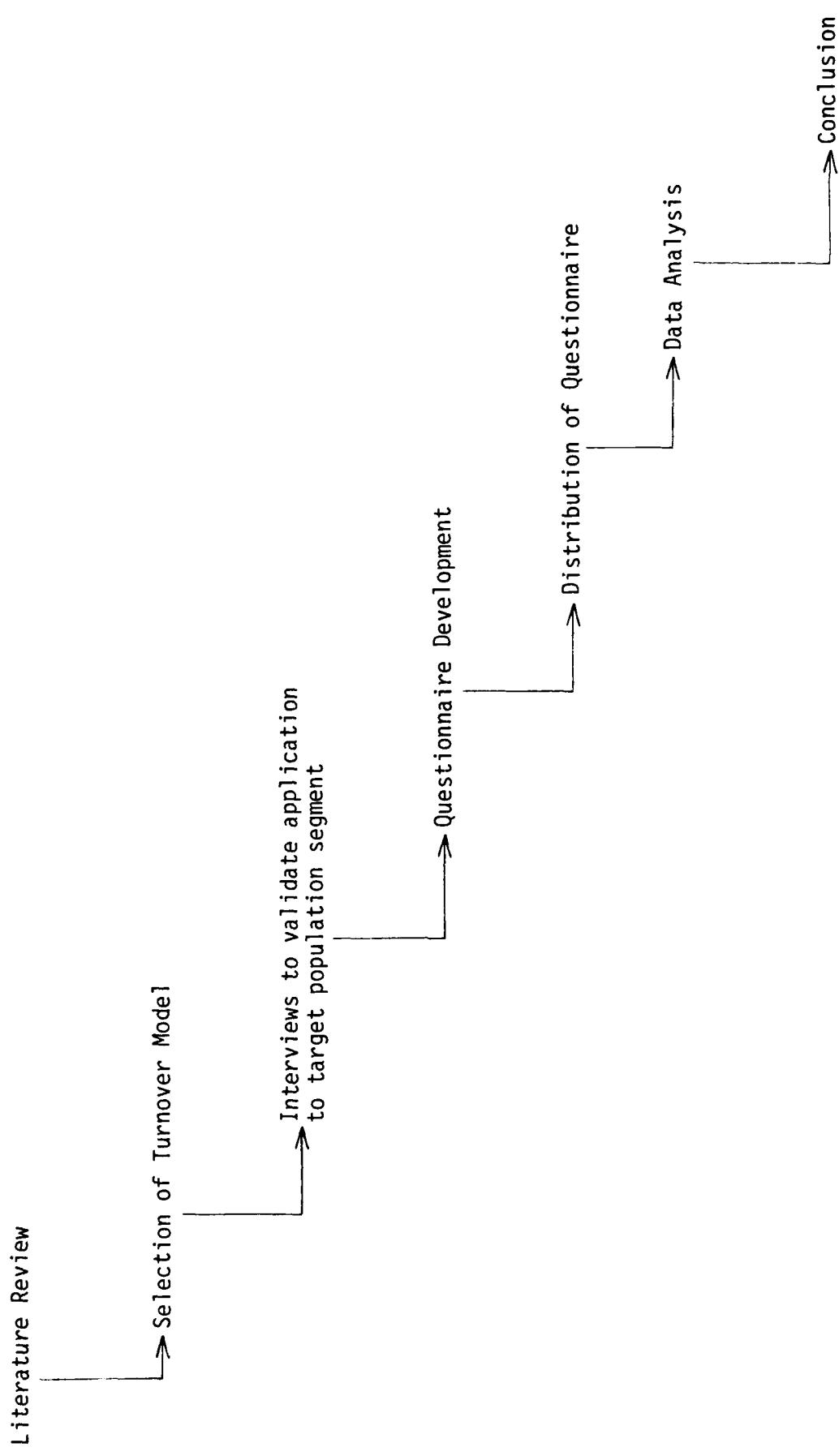


Figure 1-7

Footnotes

<sup>1</sup>See Harold K. Cress, "Shortage of Civilian Registered Nurses (RN)," Fort Sam Houston, TX, Oct 1981; Harold K. Cress, "Competitive Status in Recruiting for Specialized Civilian Nursing Positions; i.e., ICU, CCU, Neonatal, OR, and Nurse Anesthetists," Fort Sam Houston, TX, Oct 1981; Harold K. Cress, "Shortage of Civilian Registered Nurses (RN) in Army Medical Treatment Facilities," Fort Sam Houston, TX, Sep 1981; Health Services Command Civilian Personnel Office, "The Shortage of Civilian Registered Nurses (RN) because of Lack of Competitive Pay Scale in Real Life Conditions," Fort Sam Houston, TX, Oct 1981; and an interview with Harold K. Cress, Chief, Staffing Branch, CPO Division, Office of the Deputy Chief of Staff, Personnel, HQ, HSC, Fort Sam Houston, TX, 30 Oct 81.

<sup>2</sup>See W. H. Mobley et al., "Review and Conceptual Analysis of the Employee Turnover Process," Psychological Bulletin 86 (March 1979): 493-522; and C. E. Michaels and P. E. Spector, "Causes of Employee Turnover: A Test of the Mobley, Griffeth, Hand, and Meglino Model," Journal of Applied Psychology 67 (January 1982): 53-59.

<sup>3</sup>Michaels and Spector, p. 58.

<sup>4</sup>See Mobley et al., pp. 516-518; W. H. Mobley, "Intermediate Linkages in the Relationship Between Job Satisfaction and Employee Turnover," Journal of Applied Psychology 62 (February 1977): 237-239.

<sup>5</sup>D. Hellriegel and G. E. White, "Turnover of Professionals in Public Accounting: A Comparative Analysis," Personnel Psychology 26 (1973): 239 -249.

<sup>6</sup>Ibid., p. 248.

<sup>7</sup>W. S. Robinson, "Ecological Correlations and the Behavior of Individuals," American Sociological Review 15 (1950): 351-357.

<sup>8</sup>V. S. Flowers and C. L. Hughes, "Why Employees Stay," Harvard Business Review 51 (July-Aug 1973): 40.

<sup>9</sup>Mobley et al., "Employee Turnover Process," p. 495.

<sup>10</sup>Ibid., p. 519.

<sup>11</sup>Michaels and Sector, p. 57.

<sup>12</sup> See Mobley et al., "Employee Turnover Process," p. 495; Flowers and Hughes, p. 40; Michaels and Spector, p. 57; and L. W. Porter, R. M. Steers, and R. T. Mowday, "Organizational Commitment, Job Satisfaction, and Turnover Among Psychiatric Technicians," Journal of Applied Psychology 59 (1974): 603-609.

<sup>13</sup> Mobley et al., "Employee Turnover Process," p. 497.

<sup>14</sup> A. C. Bluedorn, "A Unified Model of Turnover from Organizations," Human Relations 35 (February 1982): 135-153; Mobley et al., "Employee Turnover Process," p. 495; and Michaels and Spector, p. 57.

<sup>15</sup> Nancy Dixon, Ph.D., "Managing the Changing Workforce," a workshop presented by the University of Texas, Department of Curriculum and Instruction, at Galveston, TX, 29 Jan 82.

<sup>16</sup> S. LaViolette, "Technicians Do Some Nursing Chores," Modern Health Care 12 (June 1982): 58.

<sup>17</sup> J. C. Goldsmith, Can Hospitals Survive? (Homewood, IL: Dow-Jones Irwin, 1981), pp. 184-85.

<sup>18</sup> Texas Hospital Association, Survey of Nursing Staff Requirements (Austin: Texas Hospital Association, 1981), p. 3.

<sup>19</sup> "Survey of Industries Finds Hospitals 1st in Turnover, 3rd in Absenteeism," Hospitals 56 (May 1982): 39.

<sup>20</sup> Goldsmith, p. 186.

<sup>21</sup> U.S., Dept of Health and Human Services, The Recurrent Shortage of Registered Nurses, A New Look at the Issues (Washington, DC: Government Printing Office, 1981), p. 19.

<sup>22</sup> Ibid.

<sup>23</sup> Ibid., p. 18-21.

<sup>24</sup> National Commission on Nursing, Initial Report and Preliminary Recommendations (Chicago: The Hospital Research and Educational Trust, 1981), pp. 9-12.

25

See "National Leadership Conference Highlights Programs That Work," Hospitals 56 (May 1982): 47-48; "Nurses Must Seek More Authority in Their Role in the Hospital, Nursing Expert Says," Hospitals 56 (April 1982): 65; S. G. Kernaghan, "The Nurse Shortage: How Can We Turn the Exodus Around?" Hospitals 56 (Feb 1982): 53-56; M. R. Traska, "Nurses as Managers: Acceptance Problems May Lie with Nurses Themselves," Hospitals 56 (Feb 1982) 57-59.

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A. C. Bennett, "Changing Values, Aggressiveness, Bureacracy Lead to RN Discontent," Modern Health Care 11 (Dec 1981): 94-96.

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28

Goldsmith, p. 189.

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J. McCloskey, "Influence of Rewards and Incentives on Staff Nurse Turnover Rates," Nursing Research 23 (March 1974): 239-247.

30

See J. McCloskey, p. 245; and C. Lewis and E. A. Sloane, "Hospital-Based Child Care," Hospital Forum, March/April 1982, pp. 47-49.

31

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32

U. S. Civil Service Commission, Working for the USA (Washington, DC: US Government Printing Office, 1976), p

33

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34

Interviews with Recruitment and Placement Specialists, Civilian Personnel Offices, Fort Sill, Fort Hood, and Fort Polk, 17, 18, and 23 November 1981.

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Force Development Division, Brooke Army Medical Center, Fort Sam Houston, TX, "BAMC Recruitment/Retention Impact Areas," a report dated February 1982; Civilian Personnel Office, Fort Sam Houston, TX, "Legend of Sources Surveyed," an information paper dated February 1982; and Civilian Personnel Office, Fort Sam Houston, TX., "Responses from HSC-CPO Survey I," an information paper dated January 1982.

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J. Haddad, "Nurse Shortages: The Growing Crisis," Texas Hospitals, February 1980, p. 25.

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American College of Hospital Administrators, Progress Report - Initial Report and Preliminary Recommendations (Chicago, Ill., February 1982).

<sup>38</sup> V. E. Reinhardt, On the Future of the American Economy and Its Impact on the Health Care Sector, 1980 Michael M. Davis Lecture, Chicago: University of Chicago, Ill., 28 May 1980.

<sup>39</sup> U.S., Dept of Health and Human Services, The Recurrent Shortage of Registered Nurses, p.1.

<sup>40</sup> Goldsmith, p. 187.

<sup>41</sup> US., Dept of Health and Human Services, The Recurrent Shortage of Registered Nurses, pp. 19-22.

<sup>42</sup> Flowers and Hughes, p.40.

<sup>43</sup> National Commission on Nursing, Initial Report and Preliminary Recommendations, p. 10.

<sup>44</sup> P. J. Feldstein, Health Care Economics (New York: Wiley and Sons, 1979), pp. 87-89.

## CHAPTER II

### DISCUSSION

#### The Survey

The conceptual framework of Mobley's employee turnover model (Figure 1-2) was adopted for this survey. Personal interviews of nursing and management personnel in federal nursing programs identified the need to incorporate into the study variables directly addressing the civilian/military dual system and the influence of significant others (i.e., spouse).

A three-part, 143-question survey was developed (Appendix A).

Part 1 composed the bulk of the questions through which personal perceptions of specific variables were surveyed in three contexts: degree of satisfaction in present job (current utility), degree of satisfaction anticipated in present job, and degree of satisfaction anticipated in an alternative job (anticipated utility in alternative job). A Likert-type measurement scale was used to record the responses on a five-point scale using a mark-sense form. The response scale was "Highly Satisfied," "Satisfied," "Neutral," "Dissatisfied," and "Highly Dissatisfied." The second part of the survey, composed of thirteen multiple-choice questions, addressed the basic demographics. Part 3 was composed of four open-ended questions to allow the gathering of information on potentially significant variables not included in Part 1. Quantities of the survey were mailed to thirty-seven Civilian Personnel Offices servicing Health Services Command activities for distribution to the respondents. In addition to a cover

letter explaining the survey and instructing the Civilian Personnel Office in the distribution of the surveys, letters endorsing the project from the Chief, Nursing Division, and the Chief, Civilian Personnel Division, at Health Services Command were also inclosed in an effort to generate support for the project. The Civilian Personnel Offices were requested to distribute the surveys to the three categories of respondents: (a) Currently employed in AMEDD civilian nurse positions; (b) Formerly employed in AMEDD civilian nurse positions resigning between 1 September 1981 and 28 February 1982; and (c) Declining an AMEDD civilian nurse position between 1 September 1981 and 28 February 1982. The three groups of respondents were instructed to complete the survey as follows: (a) Currently employed AMEDD civilian registered nurses in context of present job; (b) Turnover AMEDD civilian registered nurses in context of AMEDD civilian job prior to turnover; and (c) Registered nurses who declined AMEDD civilian registered nurse positions in context of expectations about the declined position.

#### Data Analysis

The total number of surveys incorporated in the data analysis was 470, representing a final adjusted response rate of approximately 40 percent.<sup>1</sup> Figure 2-1 provides a breakdown of respondents by group. Refer to Appendix B for a description of the calculation of the response rate.

Questions from Parts 1 and 2 were analyzed using programs from a version of Statistical Package for the Social Sciences (SPSS). Part 3, the open-ended questions, was screened manually. Only responses addressing current utility of present job and anticipated utility of alternative jobs from Part 1 were included in the analysis. Because of limitations

## NUMBER OF RESPONDENTS BY GROUP

Group 1	163	(35)
Group 2	174	(37)
Group 3	85	(18)
Group 4	39	(08)
Unclassified	9	(02)
Total	470	

NOTE: The parentheses denotes percent of total number.

Figure 2-1

inherent in the version of SPSS available, which established a maximum number of variables for the analysis, all of the variables in the instrument could not be incorporated into the discriminant analysis. Refer to Appendix C for discussion on limitations of variables. Figure 2-2 is the final variable list for analysis.

Discriminant-analysis techniques are useful in predicting group membership based on the combination of discriminating variables. It is a multivariate technique which accounts for the intercorrelations of a variable mix.

The final variable list was entered into a series of discriminant function analyses which were used to classify respondents into one of four groups:

- Group 1 - Stay in present job until retirement
- Group 2 - Have no reason to leave at this time
- Group 3 - Plan to leave in the near future
- Group 4 - Have informed supervisor of intent to resign, initiated resignation, already left, or declined.

FINAL VARIABLE LIST FOR ANALYSIS

<u>VARIABLE SUBJECT</u>	<u>VARIABLE CONTEXT</u>		
	<u>Present Position</u>	<u>Future Position</u>	<u>Alternate Position</u>
Current Salary	001*	043	085*
Responsibility	002*	044	086*
Working Conditions	003*	045	087
Education Opportunities	004	046	088
Recognition	005	047	089
Co-Workers Relations	006*	048	090
Growth Opportunities	007*	049	091
Policies/Procedures	008	050	092
Supervisor Relations	009*	051	093*
Work Performed	010*	052	094*
Advancement Opportunities	011*	053	095
Achievement	012*	054	096
Job Security	013	055	097
Status	014	056	098*
Role Clarity	015	057	099
Job Satisfaction - Overall	016*	058	100*
Significant Other Perception of Job	017*	059	101*
Goal Congruance	018*	060	102*
Benefits	019*	061	103*
Training Opportunities	020*	062	104*
Continuity of Patient Care	021	063	105*
Personnel System	022	064	106
Organizational Communication	023*	065	107
Collaboration - MD/RN	024	066	108*
Collaboration - Nonphysician/RN	025	067	109
Workload	026	068	110
Sense of Accomplishment	027	069	111
Supervisor	028	070	112
Co-Workers	029	071	113*
Support re Personal Goals	030*	072	114
Performance Evaluations	031*	073	115
Nursing Profession	032	074	116
Equipment/Facilities	033*	075	117
Starting Salary	034	076	118*
Retirement Program	035	077	119*
Personal Security	036	078	120*
Administrative Work Requirements	037*	079	121
Uniform Policies	038	080	122*
Control of Personal Destiny	039	081	123
Time Off	040*	082	124
Flexibility of Job	041	083	125
Future Salary	042	084	126
Sex			127
Marital Status			128
Tenure - Position			129
Tenure - Facility			130
Tenure - Civil Service			131
Pay Grade			132
Age			133
Position (Specialty)			134
Career Intentions			135
Work Hours			136*
Anticipated Satisfaction in Other Job			137*
Job Status			138

\*Final Variable

Figure 2-2

Question Number 134 of the survey, "Which of the following best describe your job intention," was used to assign group membership. The method of discriminant analysis used was MAXMINF, a method using stepwise selection criteria which maximizes the smallest F ratio between pairs of groups. Missing data were handled by ignoring all missing value declarations. For a discussion of the comparison of methods of analysis and comparison of missing data options, refer to Appendixes D and E, respectively. A series of discriminant analyses was made, each analysis incorporating all of the variables in Figure 2-2, changing the partial F criteria for entry into and exit from the stepwise analysis. The partial F is a test of the statistical significance of the amount of centroid separation added with the inclusion of the variable in excess to that provided by variables already in the analysis.<sup>2</sup> Refer to Appendixes F through H for review of complete data output as generated by this series of analyses.

Figure 2-3 displays the information derived from the discriminant analysis using a partial F of 1.5 to enter and exit the analysis. Wilks' lambda is an inverse measure of the discriminating information remaining which has not been accounted for by previous functions. The smaller Wilks' lambda is the greater the amount of information remaining to be derived. The chi-square statistic is based on the value of Wilks' lambda.<sup>3</sup>

The eigenvalues and the canonical correlations demonstrate relative power in isolating the groups. The eigenvalues is a measure of the relative importance of the function, the sum of which denotes the total variance within the discriminating variables. The canonical correlations can be viewed as the square root of the variance in the discriminant function as explained by the groups. When more than one discriminant

REMAINING COMPUTATIONS WILL BE BASED ON 3 DISCRIMINANT FUNCTIONS

DISCRIMINANT ANALYSIS OUTPUT -PARTIAL F OF 1.5

Figure 2-3

function has been derived, it is important to note the relative percentage of the total sum of eigenvalues attributed to each function.<sup>4</sup>

It is important to note, also, that Function 1 is always the most powerful and that the subsequent functions occur with progressively decreasing power. Oftentimes, not all of the functions will be used in the interpretation of the data partially because of their minimal contribution.

Analysis of the information presented in Appendices F through H indicates all three discriminant functions are statistically significant and that considerable discriminating power is present.

The centroids of groups in reduced space (Figure 2-4) are the mean discriminate scores. When plotting the groups in space, the centroid value for each function is a dimension in space.<sup>5</sup> A four-group discriminant analysis can produce three functions ( $g - 1$ ) resulting in a three-dimensional model composed of the centroids (i.e., mean discriminant scores) for each group. The greater the difference in the centroids, the greater the distance between the groups. Figure 2-5 through Figure 2-8 are two-dimensional plots of each group. All four-group centroids are plotted in Figure 2-9.

Analysis of the group centroids in space reveals that in Function 1 the greatest separation is between Group 1 and Groups 3 and 4, a simple measure of the difference in the values. Function 2 separates Groups 3 and 4. Groups 2 and 3 are furthest apart in Function 3. This pattern is repeated in all of the discriminant analyses of this survey.

The standardized discriminant function coefficients (Figure 2-10) denote the relative contribution of that variable to the relevant function. In Function 1, Variable 16 (0.38097) makes the greatest contribution to

CENTROIDS - PARTIAL F OF 1.5

CENTROIDS OF GROUPS IN REDUCED SPACE

		FUNC 1	FUNC 2	FUNC 3
GROUP	1	-0.30260	0.61398	-0.23298
GROUP	2	-0.20103	-0.13208	0.42405
GROUP	3	-0.18081	-0.95742	-0.40781
GROUP	4	2.55571	0.10985	-0.02936

Figure 2-4

PLOT OF DISCRIMINANT SCORE 1 (HORIZONTAL) VS. DISCRIMINANT SCORE 2 (VERTICAL). \* INDICATES A GROUP CENTROID.  
THE SYMBOL I DENOTES A CASE FROM GROUP 1.

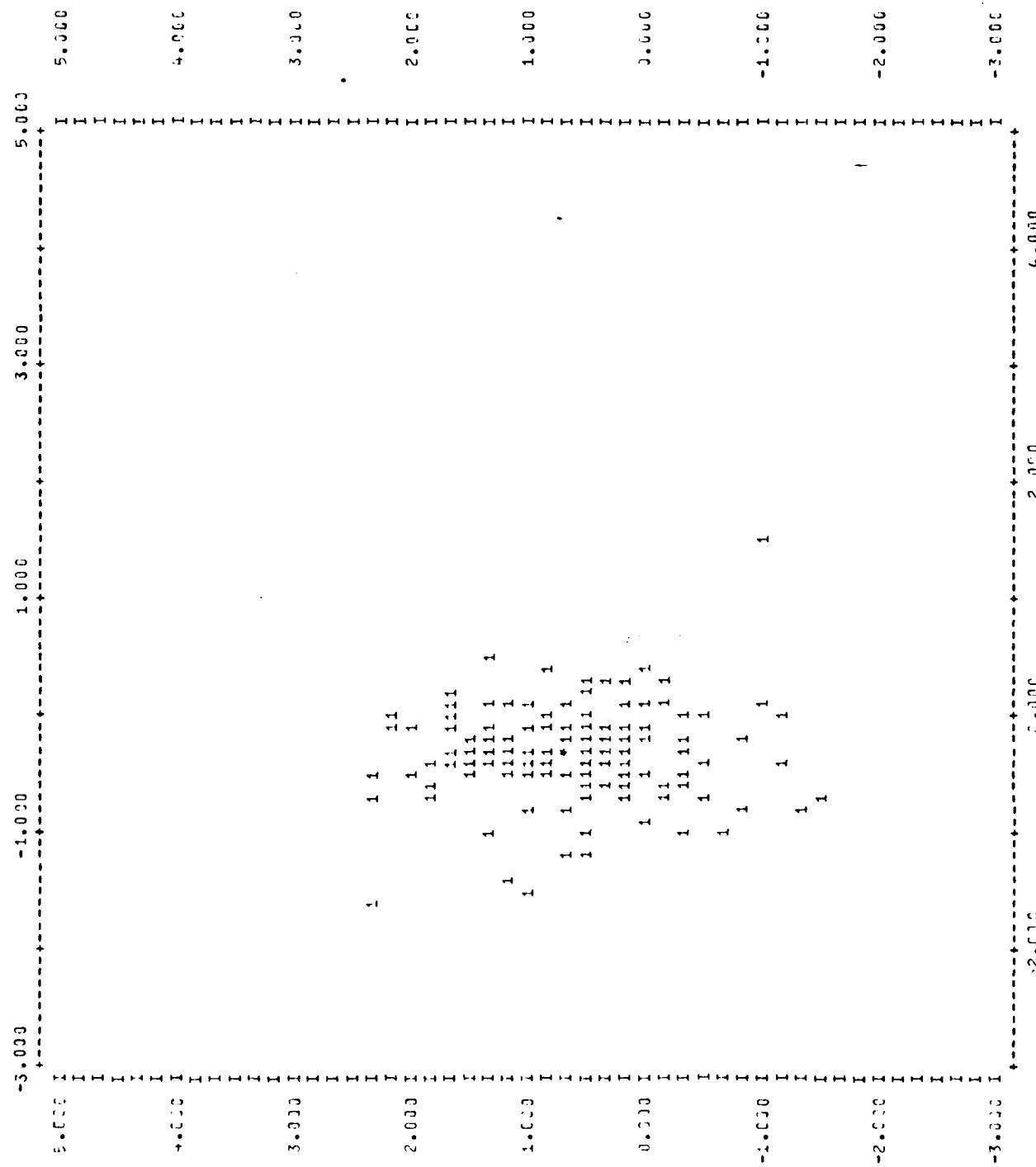


Figure 2-5

PLOT OF DISCRIMINANT SCORE 1 (HORIZONTAL) VS. DISCRIMINANT SCORE 2 (VERTICAL). \* INDICATES A GROUP CENTROID.  
THE SYMBOL 2 DENOTES A CASE FROM GROUP 2

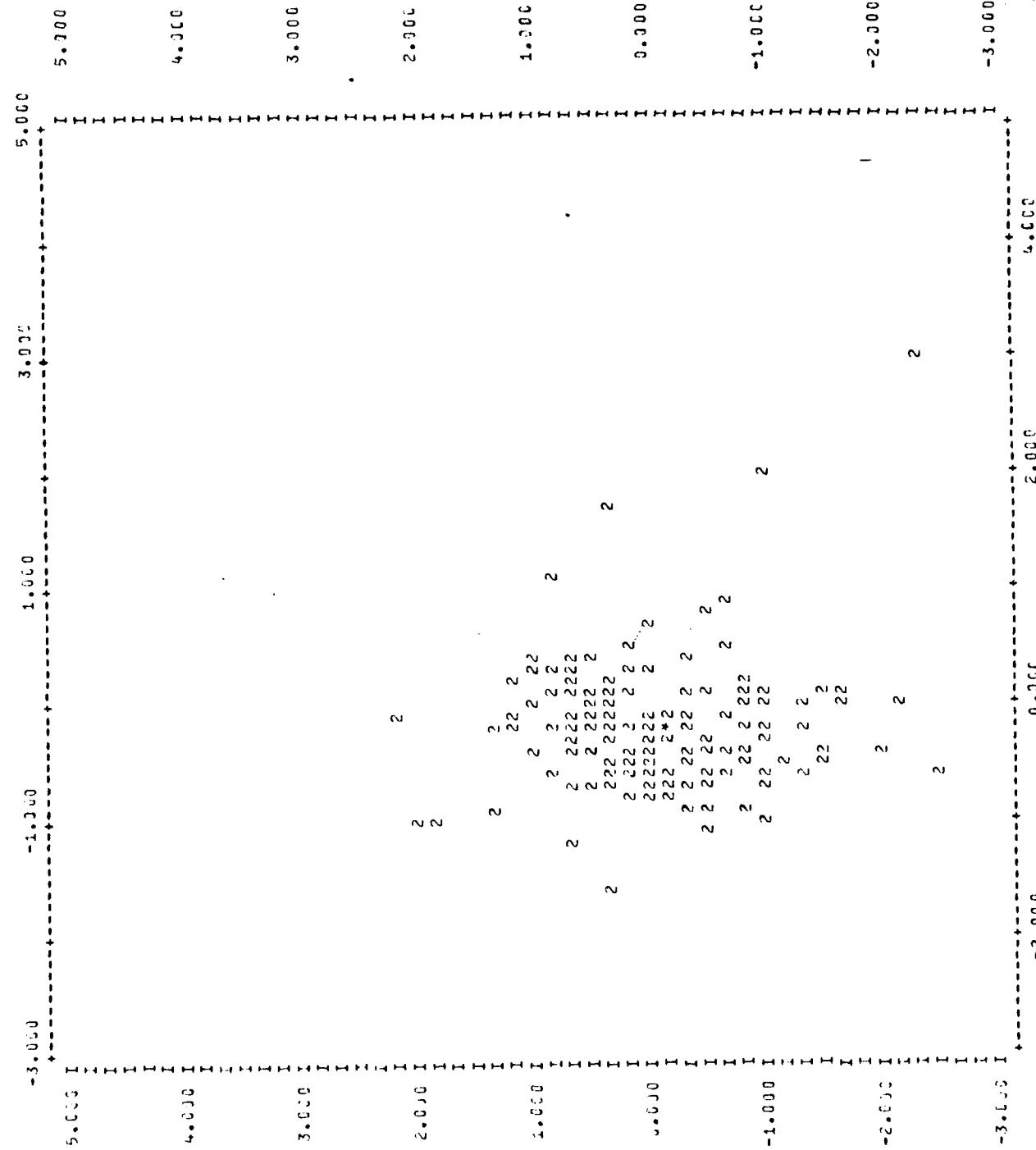


Figure 2-6

PLOT OF DISCRIMINANT SCORE 1 (HORIZONTAL) VS. DISCRIMINANT SCORE 2 (VERTICAL). \* INDICATES A GROUP CENTROID.  
THE SYMBOL 3 DENOTES A CASE FROM GROUP 3

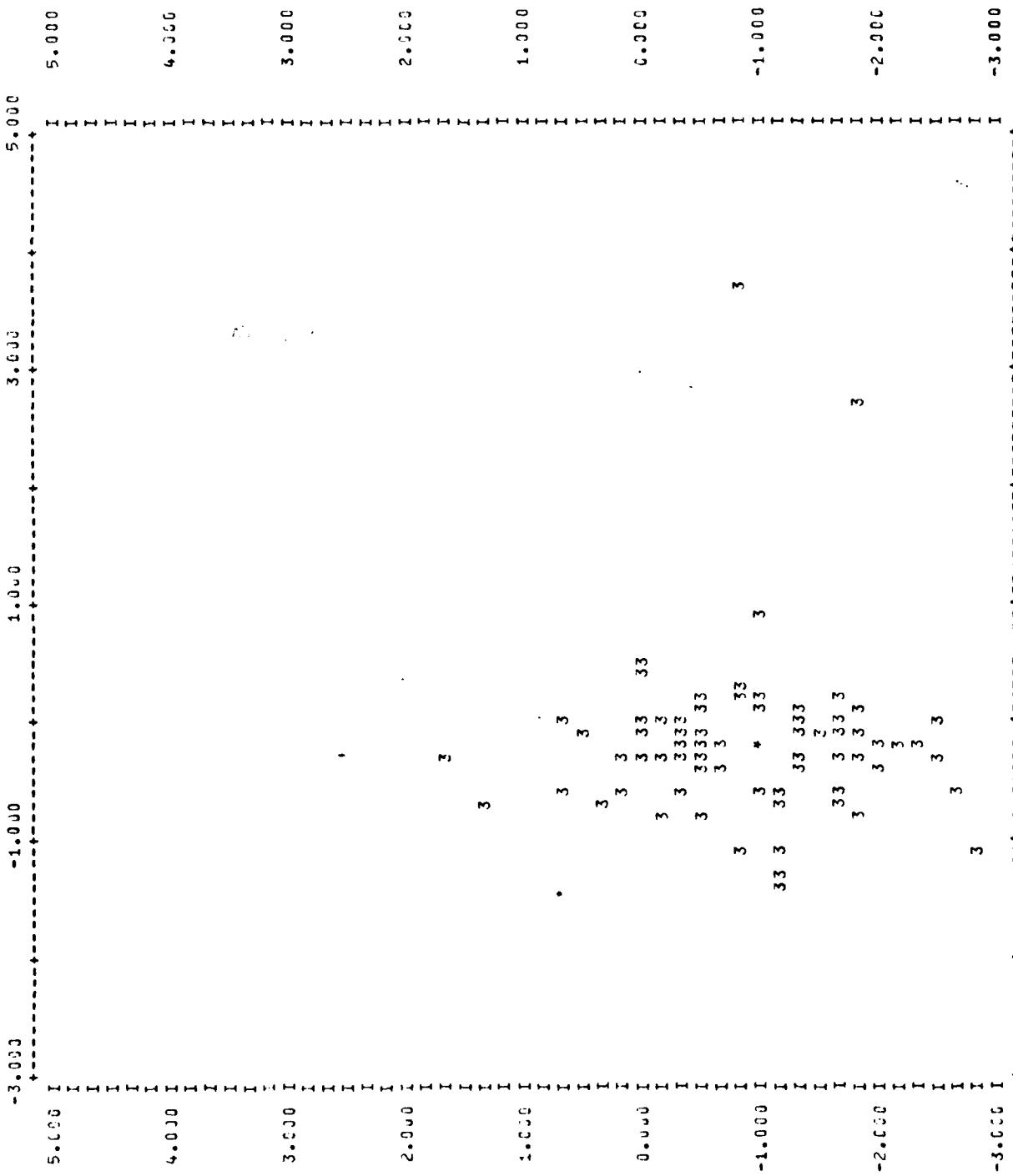


Figure 2-7

AMEDD CIVILIAN NURSE RETENTION

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PLOT OF DISCRIMINANT SCORE 1 (HORIZONTAL) VS. DISCRIMINANT SCORE 2 (VERTICAL). \* INDICATES A GROUP CENTROID.

4

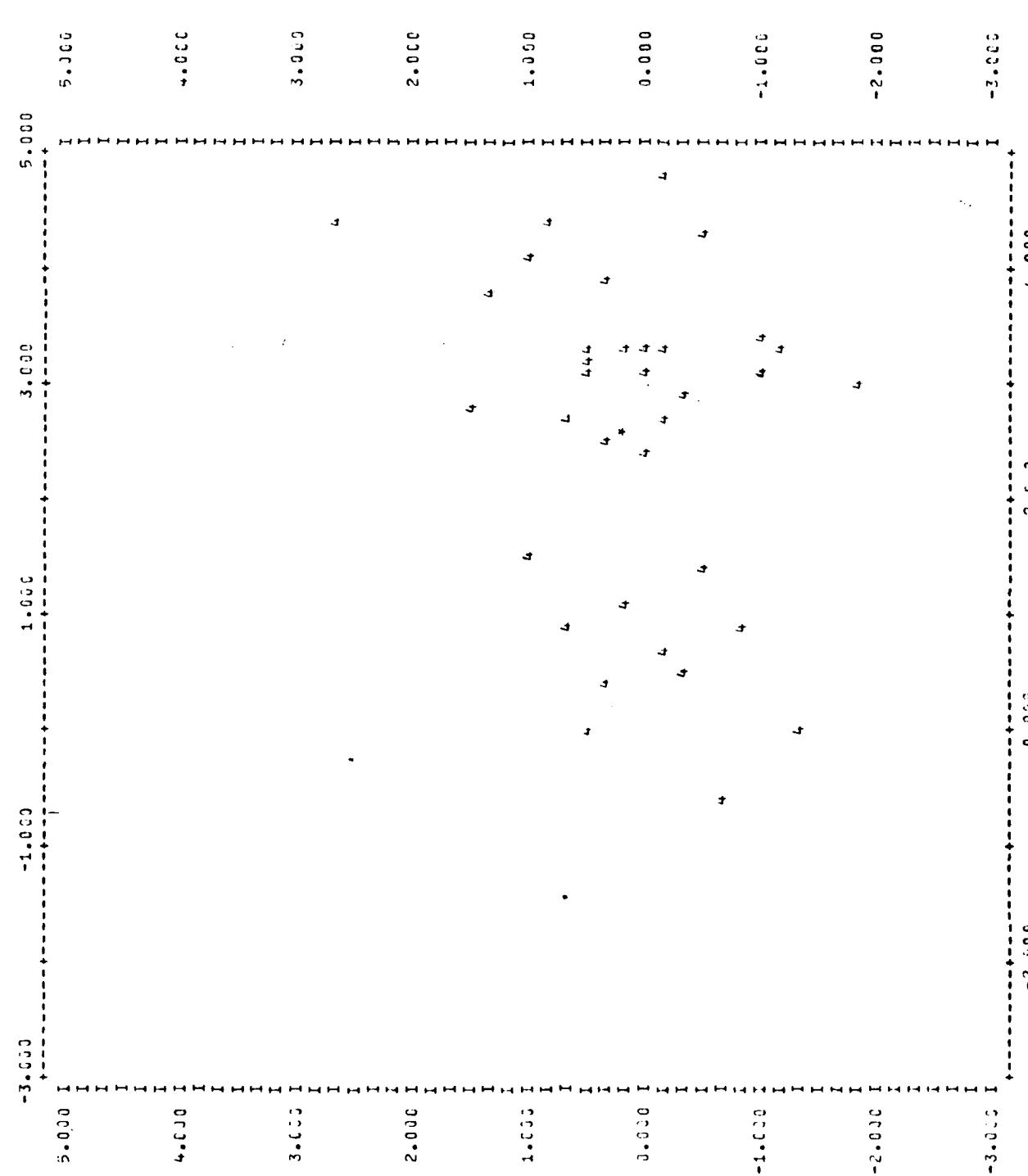


Figure 2-8

## PLOT OF DISCRIMINANT SCORE 1 (HORIZONTAL) VS. DISCRIMINANT SCORE 2 (VERTICAL). \* INDICATES A GROUP CENTROID.

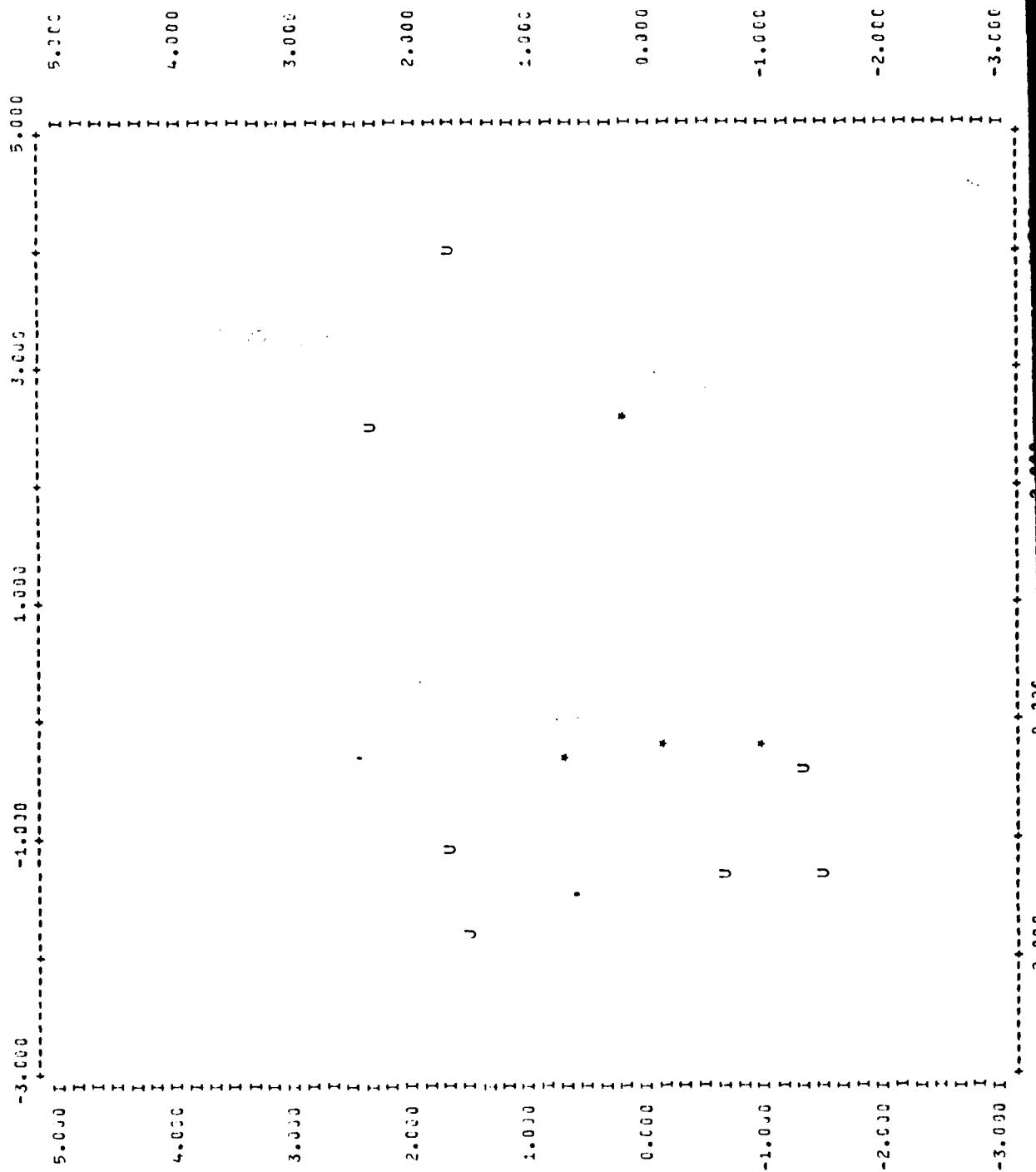


Figure 2-9

	FUNC_1	FUNC_2	FUNC_3	
VAR001	0.16692	0.08212	-0.33778	Current_Salary
VAR002	0.07838	0.23278	0.15591	Responsibility
VAR003	-0.21936	0.39235	-0.29184	Working_Conditions
VAR016	0.38097	-0.05698	-0.28009	Job_Satisfaction - Overall
VAR017	0.03686	-0.29006	0.32735	Significant_Other_Perception_of_Job
VAR018	0.21067	0.15202	-0.29238	Goal_Congruance
VAR019	0.00718	0.27952	0.26715	Benefits
VAR020	-0.11256	0.31026	0.10741	Training_Opportunities
VAR030	0.22174	-0.31413	0.04777	Support_re:Personal_Goals
VAR031	-0.15481	0.37650	-0.38992	Performance_Evaluations
VAR033	0.24443	0.04948	0.32302	Equipment/Facilities
VAR037	-0.31831	-0.08670	0.37439	Administrative_Work_Requirements
VAR040	0.30498	-0.09301	-0.14687	Time_Off
VAR045	0.36863	-0.42365	0.09984	Current_Salary
VAR06	-0.18433	0.51094	-0.01788	Responsibility
VAR093	0.08771	-0.65742	0.041365	Supervisor_Relations
VAR094	0.18516	0.25477	-0.27567	Work_Performed
VAR104	0.20992	-0.06543	0.3742993	Training_Opportunities
VAR105	-0.02904	0.441434	-0.09050	Continuity_of_Patient_Care
VAR108	0.08942	-0.45659	-0.02713	Collaboration - MD/RN
VAR113	0.16763	0.13471	0.34812	Co-Workers
VAR118	-0.31470	0.75194	0.32924	Starting_Salary
VAR120	-0.09147	-0.24431	0.0780259	Personal_Security
VAR122	-0.23395	-0.13203	-0.15057	Uniform_Policies
VAR137	-0.29607	-0.07045	-0.15211	Anticipated_Satisfaction

STANDARDIZED DISCRIMINANT COEFFICIENTS

Figure 2-10

discriminating among the groups. Although Variable 120 (-0.80259) in Function 3 is relatively large, its overall contribution is not great because the high score occurs in Function 3. In this study, the standardized discriminant functions, within context of the function order and disregarding the sign, can be said to represent the relative contribution to turnover.

The final piece of information derived in this discriminant analysis is the prediction results (Figure 2-11). The percent of respondents predicted to belong to their action groups is calculated and is an overall measure of the predictability of the equation. One should base the interpretation on the improvement over the a priori probability of group membership. In this study of four groups, the a priori probability was .25 for each group. A prediction rate of .25 is no prediction and 100 percent is perfect prediction.<sup>5</sup> To the functional manager, prediction results are the most important measure of significance of that generated through the discriminant analysis.

In addition to the series of analyses incorporating the same variable set in which the partial F was increased to isolate the minimum number of variables while minimizing the loss in discriminating power, two other sets of variables were analyzed. Overall job satisfaction, Variable 16, was removed in one analysis with minimal change (Figure 2-12). The results are interesting because there is an actual minimal improvement in the data despite the fact that this variable contributed strongly in previous analyses. The other variable set included variables 129, 130, 131, and 133; three addressing tenure and one addressing age, respectively (Figure 2-13).

## PREDICTION RESULTS -

ACTUAL GROUP	PREDICTED GROUP MEMBERSHIP			
	GP. 1	GP. 2	GP. 3	GP. 4
GROUP 1	163.	110.	26.	16.
	62.5%	16.0%	9.6%	6.7%
GROUP 2	174.	44.	61.	40.
	25.3%	35.1%	23.0%	16.7%
GROUP 3	85.	5.	17.	51.
	5.9%	20.0%	60.0%	14.1%
GROUP 4	39.	4.	0.	5.
	10.3%	0.0%	12.8%	76.9%
UNGROUPED CASES	9.	6.	2.	1.
	66.7%	0.0%	22.2%	11.1%
PERCENT OF 'GROUPED' CASES CORRECTLY CLASSIFIED				54.66%

PREDICTION RESULTS

Figure 2-11

PREDICTION RESULTS -

		DISCRIMINANT FUNCTION			RELATIVE PERCENTAGE		CANONICAL CORRELATION	
ACTUAL GROUP		NO. OF CASES			PREDICTED GROUP MEMBERSHIP		FIGUREN-U%	
GROUP		1		GP.	GP.		1	
GROUP 1	163.	103.	29.	19.	4.	2.	34.35	.505
		62.2%	17.8%	11.7%	4%	3%	0.16211	.373
GROUP 2	174.	52.	46.	39.	42.	37.	0.35542	.208
		29.9%	26.4%	22.4%	21.3%	FUNCTIONS DERIVED		
GROUP 3	85.	9.	14.	52.	10.	0.	0.6131	.000
		13.6%	16.5%	61.2%	11.8%		0.8234	.000
GROUP 4	39.	5.	2.	6.	27.	1.	0.9569	.0070
		12.8%	5.1%	12.8%	69.2%		19.870	12

PERCENT OF 'GROUPED' CASES CORRECTLY CLASSIFIED .69.46%

STANDARDIZED DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC. 1	FUNC. 2	FUNC. 3	
VAR003	-0.06291	-0.34048	0.58469	Working Conditions
VAR017	0.15363	-0.39987	-0.26363	Significant Other Perception of Job
VAR018	0.24659	0.25677	0.42379	Goal Congruance
VAR019	0.09656	0.43911	-0.25572	Benefits
VAR030	0.31633	-0.15017	0.05512	Support re: Personal Goals
VAR031	-0.22634	0.47645	0.43640	Performance Evaluations
VAR032	0.17721	0.19756	-0.53137	Equipment/Facilities
VAR037	-0.36235	-0.19585	-0.42104	Administrative Work Requirements
VAR040	0.45319	0.04588	0.15955	Time Off
VAR045	0.45686	-0.34690	-0.13668	Current Salary
VAR055	-0.15988	0.60173	0.05899	Responsibility
VAR073	0.20858	-0.73526	-0.27971	Supervisor Relations
VAR119	-0.32394	0.63918	-0.14653	Starting Salary
VAR137	-0.15433	-0.14849	0.15347	Anticipated Satisfaction

CENTROIDS OF GROUPS IN REDUCED SPACE

	FUNC. 1	FUNC. 2	FUNC. 3	
GROUP 1	-0.57223	-0.05818	0.14942	
GROUP 2	0.02672	0.04819	-0.26477	
GROUP 3	0.65546	0.49246	0.23146	
GROUP 4	0.82206	-1.04511	0.11766	

## PREDICTION RESULTS -

ACTUAL GROUP	NO. OF CASES	PREDICTED GROUP MEMBERSHIP				DISCRIMINANT FUNCTION	EIGENVALUE	RELATIVE PERCENTAGE	CANONICAL CORRELATION	
		GP. 1	GP. 2	GP. 3	GP. 4					
GROUP 1	163.	127.	25.	8.	3.	1	0.57212	79.39	0.603	
		77.92	15.3%	4.9%	1.8%	2	0.10248	14.17	0.335	
GROUP 2	174.	56.	54.	35.	31.	3	0.04876	6.74	0.216	
GROUP 3	85.	13.	12.	4.1%	17.	4				
		15.3%	16.1%	50.6%	20.0%	0	1.5501	270.712	30	0.300
GROUP 4	39.	6.	5.	7.	21.	5	0.8649	65.764	18	0.000
		15.4%	12.8%	17.9%	53.6%	2	0.9535	21.567	8	0.006

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED 53.15%

## STANDARDIZED DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2	FUNC 3	
VAP001	0.12741	-0.15134	0.58993	Current Salary
VAP002	0.24063	-0.23666	-0.07054	Responsibility
VAP017	0.03755	0.53518	-0.15326	Significant Other Perception of Job
VAR018	0.15810	-0.08688	0.53134	Goal Congruence
VARJ13	-0.02162	-0.48600	-0.45122	Benefits
VAR010	0.20699	0.03566	0.27659	Time Off
VAR013	0.10010	0.63538	-0.14246	Supervisor Relations
VAR118	-0.05386	-0.76931	-0.34269	Starting Salary
VAR129	-0.33471	0.07390	0.53336	Tenur - Position
VAR133	-0.61325	-0.20080	-0.00492	Age

## CENTROIDS OF GROUPS IN REDUCED SPACE

	FUNC 1	FUNC 2	FUNC 3	
GROUP 1	-0.73263	0.03397	0.12501	
GROUP 2	0.12548	-0.04349	-0.27123	
GROUP 3	0.75533	-0.37983	0.24607	
GROUP 4	0.85690	0.97771	0.15130	

DISCRIMINANT ANALYSIS WITH TENURE AND AGE VARIABLES

Figure 2-13

Demographic characteristics are presented in Figures 2-14 and 2-15. Career intent, age, pay grade, marital status, and tenure were significantly different ( $p < .005$ ) by group. Sex distribution by group was almost identical ( $p > .995$ ). Little variance was demonstrated in position. As one would anticipate, those persons turning over or inclined to do so in the near future (Groups 3 and 4) tended to have less tenure in all three areas (position, facility, and civil service).

A t-test was performed for each group comparing the respondents' perceptions of present job satisfaction with anticipated utility in an alternate job. For example, the average response on Question 7 (i.e., growth opportunities in present job) was compared with the average response on Question 91 (i.e., growth opportunities anticipated in alternate position) by group. There was little difference in perceived utility of present versus alternative job in Group 1 reference future salary, workload, continuity of patient care, or goal congruence. Groups 1 and 2 perceived the same strong difference between present retirement program and that associated with an alternative job, in favor of the former. All groups significantly perceived the same differences in growth and advancement opportunities, favoring of the alternative job. A two-group (those that have resigned/declined and those that have not) cross tabulation of variables reveals virtually no difference in the groups' perception of the nursing profession in general or their work hours as demonstrated through the chi-square analysis.

As one would anticipate, the open-ended questions in Part 3 of the survey precipitated a multitude of different reasons for turnover, plus likes and dislikes about the job. Only one specific item was consistently

## DEMOGRAPHIC DATA

	TOTAL	GROUP 1	GROUP 2	GROUP 3	GROUP 4
<u>Work Hours</u>					
Three Rotating Shifts	252(54)	85(54)	102(60)	42(51)	23(61)
Two Rotating Shifts	141(30)	44(28)	53(31)	31(38)	12(31)
Day Shift	54(11)	27(17)	15(09)	9(11)	3(08)
Other	23(05)				
	No chi-square calculation			Missing observations 23	
<u>Career Intent</u>					
Full time nursing	334(73)	141(87)	132(76)	42(51)	19(49)
Part time nursing	60(13)	5(03)	25(15)	16(19)	14(36)
Discontinue working	17(04)	7(04)	4(02)	4(05)	2(03)
Change careers	46(10)	9(06)	12(06)	21(25)	5(13)
	Chi-square - Significance = 0.0000			Missing observations 14	
<u>Position</u>					
ICU	122(27)	31(29)	50(29)	30(35)	11(28)
OR/Anesthesia	18(4)	8(02)	4(05)	4(05)	2(05)
Other	318(69)	122(68)	118(60)	51(60)	26(67)
	Chi-square - Significance = 0.6004			Missing observations 1	
<u>Age</u>					
25	5(01)	0(00)	2(01)	1(01)	2(05)
25-30	49(11)	3(02)	19(11)	15(18)	12(31)
31-35	79(17)	7(04)	39(22)	24(28)	9(23)
36-40	68(15)	11(07)	29(17)	22(26)	6(15)
40	261(56)	142(87)	85(49)	23(27)	11(30)
	Chi-square - Significance = 0.0000			Missing observations 8	
<u>Pay Grade</u>					
GS8	11(02)	3(02)	5(03)	2(02)	1(03)
GS 9-10	417(91)	142(88)	161(93)	78(92)	36(92)
GS11	29(06)	16(10)	7(04)	4(05)	2(05)
	Chi-square - Significance = 0.0000			Missing observations 14	
<u>Marital Status</u>					
Married	322(70)	104(64)	129(74)	57(67)	32(84)
Single	70(15)	21(13)	26(15)	18(21)	5(13)
Other	68(15)	37(23)	19(11)	10(12)	2(06)
	Chi-square - Significance = 0.0023			Missing observation 10	
<u>Sex</u>					
Male	22(05)	7(04)	9(05)	4(05)	2(05)
Female	438(95)	155(96)	165(95)	81(95)	36(95)
	Chi-square - Significance = .9951			Missing observations 10	

NOTE: Figures in parenthesis denote percent of total for column (group).

Figure 2-14

## DEMOGRAPHIC DATA - TENURE

	TOTAL	GROUP 1	GROUP 2	GROUP 3	GROUP 4
<b>Position Tenure</b>					
<6 mos	48(10)				
6-12 mos	55(12)	8(05)	19(11)	12(14)	9(23)
1-5 yrs	131(28)	12(07)	25(15)	14(17)	4(10)
>5 yrs	220(48)	16(10)	70(40)	33(39)	12(31)
Never employed in AMEDD position	7(02)	126(77)	58(35)	24(28)	11(28)
Chi-square- Significance = 0.0000 Missing observations 17					
<b>Facility Tenure</b>					
<6 mos	44(10)	6(04)	21(12)	11(13)	6(15)
6-12 mos	52(11)	11(07)	22(13)	13(15)	6(15)
1-5 yrs	140(30)	17(10)	72(41)	35(41)	16(41)
>5 yrs	220(48)	128(79)	58(33)	25(29)	8(21)
Chi-square - Significance = 0.000 Missing observations 15					
<b>Civil Service Tenure</b>					
<6 mos	22(05)	1(01)	12(07)	7(08)	2(05)
6-12 mos	39(09)	7(04)	18(10)	11(13)	3(08)
1-5 yrs	110(24)	9(07)	58(33)	26(31)	17(44)
>5 yrs	285(62)	145(90)	85(49)	40(47)	14(36)
Chi-square - Significance = 0.0000 Missing observations 1					

NOTE: Figures in parentheses denote percent of total for column (group).

Figure 2-15

negatively mentioned, rotating shifts. Workload, unequal consideration (favoring the military nurse), pay, benefits, and advancement opportunities were often specifically mentioned as dissatisfiers. The type of work performed (i.e., nursing) was overwhelmingly viewed positively. The bulk of the remaining items appeared to be associated either directly or indirectly to management skill and techniques.

#### Data Interpretation

The results of the discriminant analyses have identified several variables that, as a set of intercorrelated variables, can predict group membership to a significant degree. The analyses consistently separate Groups 3 and 4 from Group 1 in the first function; Group 3 from Group 4 in the second function; and Group 3 from Group 2 in the third and least significant function.

Generally speaking, no single powerful discriminating variable was identified. Furthermore, there was no clearly identified related variable groups. Instead, for the most part, the discriminating variables demonstrated comparatively mild differences in their discriminating ability. This result indicates there are no major single variables or variable groups, of those included in the survey, that can discriminate between the nurses that currently plan to stay and those who plan to leave. As an interrelated mix of variables, however, significant discriminant power exists. It is the aggregate combination of the variables into a whole that creates the power of prediction demonstrated.

The variables in the equation are a mix of variables addressing satisfaction in the present job and anticipated utility in an alternative job, thus supporting the impact of factors external to the organizational

environment. The influence of the significant other is also demonstrated as a variable to turnover. Salary was the strongest and most consistent discriminator. The addition of the set of tenure variables and the age variable did isolate age as a powerful discriminator; however, that variable mix did not have as high an accurate prediction rate for the turnover group as previous analyses.

It is interesting to note that the rotating shifts variable was not a discriminator in the discriminant analysis, despite the frequency with which it was mentioned in response to questions in Part 3 of the survey. One reason explaining why rotating shifts was not a discriminator is the fact that there are limited alternatives available, though the private sector is evolving toward established shifts and away from rotating shifts. Another reason rotating shifts is not a discriminator is because it is a universal dissatisfier. All four groups were nearly equally dissatisfied with rotating shifts as demonstrated by the chi-square analysis. Unless there is a difference perceived by one or more of the groups, the variable cannot be a discriminator. The inverse applies to the variable, nursing profession. The chi-square analysis shows the groups were nearly equally satisfied with nursing.

The adjusted response rate of approximately 40 percent must be addressed. Babbie is of the opinion that a response rate of 50 percent is adequate for analysis and reporting, 60 percent is good, and 70 percent is very good. One reason a high response is desirable is that the response bias can usually be controlled. Babbie further states that high response rates are not as important as demonstrated lack of response bias.<sup>7</sup> Because of problems encountered in distributing and accounting for the surveys, it is not possible to objectively address response bias.

Footnotes

<sup>1</sup>F. J. Kviz, "Toward a Standard Definition of Response Rate," Public Opinion Quarterly, 41 (1977): 265-267.

<sup>2</sup>N. H. Nie et al., Statistical Package for the Social Sciences 2nd ed. (New York: Mc-Graw-Hill, 1975), p. 453.

<sup>3</sup>Ibid., pp. 440-443.

<sup>4</sup>Ibid.

<sup>5</sup>Ibid., p. 440

<sup>6</sup>J. P. Allegrante et al., "A Discriminant Analysis of Student Utilization Behavior at a University Health Service," Journal of the American College Health Association 26 , No. 3 (1977): 147.

<sup>7</sup>E. R. Babbie, The Practice of Social Research, 2nd ed. (Belmont, California: Wadsworth Publishing Company, 1979), p. 335.

## CHAPTER III

### CONCLUSION

As demonstrated by Mobley's model of employee turnover (Figure 1-2), the turnover process is complex and wholistic in nature. It is not surprising then that this survey did not identify any extraordinarily powerful single or group discriminator. In fact, one could say that the survey tends to support the idea of wholism in regard to the turnover process, at least among civilian nurses employed by the AMEDD. The study also supports the idea fostered by Flowers and Hughes that people stay for reasons other than satisfaction associated with the present job.

The results of this study must be viewed as what they are - a snapshot in time of the perceptions of the worker. The supraenvironment is constantly in a flux as are the many subenvironments. A seemingly unrelated future event may indirectly affect the retention of civilian registered nurses in the AMEDD. Directly, an adjustment in salary or alteration in rotating shift policy will effect retention.

The implications for management in an environment defined in context of Mobley's model are realized. Elementary managerial theory addresses the issues prescribed in the model. Why then is there a current retention problem? First, comments received in response to questions in Part 3 of the survey indicate the first-line supervisors bear little understanding of the Civil Service System and are not fully aware of the impact of their management activities, especially scheduling. Adequate training of the first-line supervisor in these two areas could

be a deterrent to turnover. Second, there are inherent barriers to the Civil Service System that create a climate in which only certain registered nurses will stay. Whether the climate was designed to selectively retain this segment of the nurse pool or whether it was accidental is, in one sense, of little consequence. One must be aware of the impact of such a system and manage accordingly. In another sense, unless the system was intentionally created, not necessarily exclusively for, but inclusively of, nurses, then change should be actively sought to tailor a system to fit the needs of the organization. The point must be emphasized here that it is imperative to have the needs of the organization incorporate the common needs of the worker. Third, the private sector has become more competitive, especially in pay and through perquisites. The Civil Service System must remain competitive to maintain sufficient nurse personnel.

Some specific recommendations can be made to addresss these fundamental areas. The work environment can be made more appealing through attention to basic dissatisfiers, promoting communication and a means of allowing grievances to be addressed, and eliminate the requirement to rotate three shifts. Consideration should be given to external factors which affect the workers, such as the need for day care service twenty-four hours a day. Changes can be made in the work role. Transferring non-nursing duties (i.e., answering telephone, drawing blood, escorting patients, etc.) to others can promote increased efficiency in personnel utilization and free the registered nurse to perform more nursing duties. Instituting undergraduate and graduate scholarship programs similar to that recently implemented by the Veterans Administration could fulfill the motivational needs of some nurses and, at the same time, obligate them for a period of service.

One must recognize that turnover is not always undesirable. A system cannot exist to meet the needs of all potential registered nurses. The system must be designed to promote retention of that segment most useful to meeting the organization's objectives while promoting voluntary or involuntary turnover of workers outside that segment.

In summary, a nursing shortage exists currently and will most likely worsen. Retention and turnover of civilian registered nurses in the AMEDD appear to be governed by variables also observed elsewhere in the nursing profession. Training of first-line supervisors to develop management skills may deter turnover. Salary and rotating shifts appear to be potentially significant discriminators with the anticipated upcoming changes in the private sector. Some factors are within the purview of the manager. Others require intervention to alter policies and procedures in the Civil Service System. The effective manager will be proactive - monitoring for change, managing that which is within his control, and accommodating to that which is not.

APPENDIX A  
QUESTIONNAIRE - SURVEY INSTRUMENT

Hello, I am CPT Frank McDonald assigned to Brooke Army Medical Center, Fort Sam Houston, Texas. The attached survey has been forwarded to you in hopes that you will assist me in a project concerned with the retention of civilian nurses in Army Medical Treatment Facilities (MTF). This survey has been sent to Civilian Personnel Offices servicing Army MTF for forwarding to currently employed civilian nurses and those, within the last six months, who have either voluntarily resigned or declined a position at the MTF. This project is being conducted for two reasons:

(1) Partial fulfillment of the requirements for a masters of arts degree in Health Care Administration.

(2) It is hoped that relevant factors may be identified which may be used to enhance the retention of the civilian nurse.

Your participation will be greatly appreciated and is, of course, strictly voluntary. I personally assure you that the information will be safe guarded and handled so that individual responses will be indiscernible.

The survey is composed of three types of questions which are segregated into three sections. If you VOLUNTARILY RESIGNED try to complete the survey in context of the job at the time of your resignation. If you DECLINED a position try to complete the survey in context of your expectations of the job at the time you declined. If you receive multiple surveys, complete only one.

Your response must be received NLT 29 March to be included in the project!

Section A - Use the red answer sheet - the side with spaces 1 thru 210. Read directions on answer sheet (there will be no true-or-false questions). Each of the fourty-two questions require THREE SEPARATE ANSWERS:

FIRST ANSWER should reflect your view in perspective of your present position in the Army MTF. Answer is always marked in column #1 headed by space #1.

SECOND ANSWER should reflect your view in perspective of future positions in the Army MTF. Answer is always marked in column #2 headed by space #43.

THIRD ANSWER should reflect your view in perspective of an alternative position in another hospital. Answer his always marked in column #3 headed by space #85. Example, question #2 -- FIRST ANSWER in space #2; SECOND ANSWER in space #44; THIRD ANSWER in space #86.

Response Scale for Section A items:

- A. Highly satisfied
- B. Satisfied
- C. Neutral
- D. Dissatisfied
- E. Highly dissatisfied

Mark Answers on Red Answer Sheet

COLUMN #1	COLUMN #2	COLUMN #3
Present Position	Future Position	Alternative Position

	COLUMN #1 Present Position	COLUMN #2 Future Position	COLUMN #3 Alternative Position
2. Responsibility	2	44	86
3. Working Conditions	3	45	87
4. Education Opportunity	4	46	88
5. Recognition Received	5	47	89
6. Relations with other Workers	6	48	90
7. Opportunities for Growth	7	49	91
8. Policies & Procedures	8	50	92
9. Relations with Supervisors	9	51	93
10. Work Performed	10	52	94
11. Advancement Opportunities	11	53	95
12. Achievement	12	54	96
13. Job Security	13	55	97
14. Status	14	56	98
15. Role Clarity	15	57	99
16. Overall Job Satisfaction	16	58	100
17. Perception of Significant other re: job	17	59	101
18. Congruance of your goals/objectives with those of the organization	18	60	102
19. Benefits	19	61	103
20. Training Opportunities	20	62	104
21. Continuity of Patient Care	21	63	105
22. Personnel System	22	64	106
23. Organizational Communication	23	65	107
24. Collaboration by nurses & physicians	24	66	108
25. Collaboration by nurses & other non-physician	25	67	109
26. Workload	26	68	110
27. Sense of Accomplishment	27	69	111
28. Supervisor	28	70	112
29. Co-Workers	29	71	113
30. Support re: your Personal goals	30	72	114
31. Performance Evaluations	31	73	115
32. Nursing Profession	32	74	116
33. Equipment & Facilities	33	75	117
34. Starting Salary	34	76	118
35. Retirement Program	35	77	119
36. Personal Security	36	78	120
37. Administrative Work Requirements	37	79	121
38. Uniform Policies	38	80	122
39. Control of Personal Destiny	39	81	123
40. Time Off	40	82	124
41. Flexibility of Job	41	83	125
42. Future Salary	42	84	126

**Section B - Single answer multiple choice questions to be answered on red answer sheet in column headed by space #127.**

Mark answers on red answer sheet.

127. Sex:



128. Martial Status:

- (A) Married      (B) Single      (C) Other

129. Length of time employed in this position?

- (A) Less than 6 months (D) More than 5 years  
(B) 6 - 12 Months (E) Never  
(C) 1 - 5 Years

130. Length of time employed in this facility?



131. How long have you been in the Civil Service?



**132. Civilian pay grade:**



133. Age:



134. Which of the following best describes your job intentions?

- (A) Stay in present job until retirement
  - (B) Have no reason to leave at this time
  - (C) Plan to leave in near future
  - (D) Have informed supervisor or initiated resignation or already left or declined

135. Your position:

- (A) ICU Specialty      (B) OR/Anesthesia      (C) All other

136. Which of the following best describes your career intentions?

- (A) Stay in nursing as full time career
- (B) Work in nursing part time
- (C) Discontinue working
- (D) Discontinue nursing - change to another career

137. Work hours:

- (A) Three rotating shifts
- (B) Two rotating shifts - day & evening
- (C) Two rotating shifts - day & night
- (D) Two rotating shifts - evening & night
- (E) Worked day shift

138. How successful do you expect you would be in finding greater satisfaction in a different nursing job or profession?

- (A) Highly successful
- (B) Successful
- (C) Unsuccessful
- (D) Highly unsuccessful

139. When did you decline/resign?

- (A) Currently employed
- (B) Declined prior to 1 December
- (C) Declined after 1 December
- (D) Resigned prior to 1 December
- (E) Resigned after 1 December

Section C - Questions are open ended. Space is provided for the answer following the question.

1. If you are currently employed at an Army MTF briefly list the likes, dislikes and you plans re: the job.

2. If you have declined or resigned a position at an Army MTF briefly list reasons.

3. What would make the job more attractive to you?

4. What single most important factor could cause/has caused you to resign/decline?

Return red answer sheet and the answers to Section C questions via the self-addressed envelope - no postage is necessary. Thank you for your participation in this survey. Your assistance is greatly appreciated.

APPENDIX B  
RETURN RATE CALCULATIONS/SURVEY DISTRIBUTION PROCESS

## RETURN RATE CALCULATIONS/SURVEY DISTRIBUTION PROCESS

The response rate was calculated using the following formula:

$$RR = \frac{n}{A_r - (B_r + C_r + D_r + E_r) + A_c - (C_c + D_c + E_c)}$$

Where:

RR = Response Rate

$A_c$  = Surveys distributed by CPO 1224

$A_r$  = Surveys distributed by investigator 60

$B_r$  = Returned to sender 15

$C_c$  = Ungrouped cases - currents RNs 11

$C_r$  = Ungrouped cases - turnover RNs 4

$D_c$  = Unreadable cases - current RNs 80

$D_r$  = Unreadable cases - turnover RNs 4

$E_c$  = Returned after deadline - current RNs 12

$E_r$  = Returned after deadline - turnover RNs 2

n = Surveys in analysis 470

The aggregate RR is:

$$RR = \frac{470}{60 - (15 + 4 + 4 + 2) + 1224 - (11 + 80 + 12)}$$

$$RR = \frac{470}{1156}$$

$$RR = .406$$

The distribution of the surveys was designed as a three-step process:

- (a) Mail packet to Civilian Personnel Office (CPO) servicing the medical treatment facility (MTF). Each packet contained, in addition to

the letters of instruction and endorsement, the surveys for registered nurses who had resigned or declined. Surveys for the latter group were enclosed in a franked envelope along with a return addressed and stamped envelope and answer sheet.

(b) Since only the local CPO maintains adequate records of names and addresses of those who have declined or resigned, the CPO was tasked to address the envelopes of this group and mail the surveys. At the same time, the CPO was to locally distribute the survey with a return envelope to nurses currently employed. All surveys were identical - only the method of dispersement differed.

(c) The respondent was instructed in the process for completion of the survey and to return the survey via the enclosed envelope.

Unfortunately, erroneous advice was received when designing this study. The majority of the surveys addressed and mailed using franked envelopes were not delivered to the addressee but returned to the investigator. These surveys had to be re-addressed and mailed again in unfranked envelopes.

It is impossible to accurately determine the number of surveys distributed to those who declined or resigned since an undetermined number were delivered via franked envelopes.

APPENDIX C  
REFINEMENT OF THE VARIABLE LIST

## REFINEMENT OF THE VARIABLE LIST

The SPSS user manual does not limit the number of variables for discriminant analysis. Unfortunately, the computer support available to analyze the data of this project utilizes a version of SPSS which has an inherent limitation on the number of variables to be analyzed at any one time. An *a priori* decision was made to completely eliminate all the variables addressing the anticipated utility in present job.

The analysis of the remaining data was accomplished in two basic steps with refinements in subsequent analyses. Two sets of variables were analyzed separately (Tabs 1 and 2 respectively). The significant variables identified through the separate discriminant analyses were combined into a final variable list for final analysis (Figure 2-2).

The initial two variables in Step 1 were composed of:

- (a) All variables addressing utility of present job (Questions 1-42)  
plus selected demographics (Questions 137-138)
- (b) All variables addressing anticipated utility of alternative job (Questions 85-126) plus selected demographics (Questions 137-138)

A discriminant analysis was performed utilizing method MAXMINF with a partial F for entry and exit of 1.0. The variables from the two groups identified by the separate discriminant analysis for inclusion in the analysis were combined to form the final variable list (Figure 2-2).

TAB 1 REFINEMENT OF THE VARIABLE LIST

VARIABLES - 001-042 plus 128-131, 133, 136, and 137

METHOD - Discriminant Analysis/MAXMINF

FILE NAME (CREATION DATE = 05/11/82)

DISCRIMINANT ANALYSIS TABLE

STEP NUMBER	VARIABLE ENTERED REVISED	F TO ENTER OR REMOVE	NUMBER INCLUDED	WILKS' LAMBDA	SIG.	CHANGE IN RATIO'S V	SIG. CF CHANGE
1	VAR133	4.3*7.6425	1	0.77674	0.000	1.31*35.291	0.000
2	VAR119	5. 8045. 9	2	0.74816	0.000	1.5*36.234	0.000
3	VARJ31	3. 29392	3	0.73227	0.000	1.6*56.373	0.016
4	VARJ28	4. 19345	4	0.71255	0.000	1.75*45.687	0.002
5	VAR025	4. 55073	5	0.69170	0.000	1.92*20.401	0.001
6	VARJ55	5. 94727	6	0.66542	0.000	2.14*74.049	0.000
7	VARJ37	2. 3045. 9	7	0.65536	0.000	2.22*71.035	0.047
8	VARJ17	2. 55273	8	0.64439	0.000	2.31*91.734	0.227
9	VARJ11	4. 55+5. 3	9	0.62535	0.000	2.68*4.3631	16.51697
10	VARJ12	1.62530	10	0.61862	0.000	2.53*9.3847	0.50216
11	VARJ36	2.10156	11	0.61001	0.000	2.62*32.070	0.389
12	VAR023	0.64603	12	0.61266	0.000	-2*22.325	0.000
13	VARJ10	2.16932	13	0.60396	0.000	2.67*8.0033	7.70338
14	VARJ97	1.54492	14	0.59765	0.000	2.73*51.447	5.71365
15	VARJ35	2.62949	15	0.58724	0.000	2.82*14.611	0.63234
16	VARJ27	4. 8934+	16	0.56942	0.000	303*322.30	21.17549
17	VAR128	1.72677	17	0.56195	0.000	310*02427	6.70197
18	VARJ02	3. 33+4. 6	18	0.54941	0.000	324*974.68	1.4*50.61
19	VAR034	1.64395	19	0.54334	0.000	331*4.4893	0.126
20	VAR133	3. 91504	20	0.52921	0.000	348*504.14	0.035
21	VARJ11	1.15357	21	0.52535	0.000	352*4.9581	0.000
22	VAR132	3. 14053	22	0.49731	0.000	367*92.004	35*424.2
23	VAR129	3.46397	23	0.48576	0.000	405*16.437	17*24.434
24	VARJ116	3.24323	24	0.47516	0.000	419*322.3	14*157.65
25	VARJ22	1.21729	25	0.47120	0.000	425*531.81	17*31.426
26	VARJ18	2.72656	26	0.46249	0.000	438*320.49	12*78.866
27	VAR022	0.89599	27	0.46532	0.000	433*92.369	-4*39.681
28	VARJ23	2.25794	28	0.45817	0.000	442*35.174	0.42805
29	VAR124	1.94935	29	0.46118	0.000	478*62.190	-3*72.994
30	VAR130	1.27781	30	0.45714	0.000	444*7.3276	6.11026
31	VAR040	3. 13373	31	0.44742	0.000	460*0.4893	15*31.697
32	VARJ09	2.06152	32	0.44111	0.000	471*34.644	0.010
33	VAR074	1.94459	33	0.44400	0.000	467*8.8431	-3*46.213
34	VAR134	1.35596	34	0.43936	0.000	474*12.153	6.23722

DISCRIMINANT FUNCTION	EIGENVALUE	RELATIVE PERCENTAGE	CANONICAL CORRELATION	FUNCTIONS DERIVED	WILKS' LAMBDA	CHI-SQUARE	DF	SIGNIFICANCE
1	3.77171	74.38	.560	1	0.4399	355*481	78	0.000
2	3.14725	14.19	.358	2	0.7793	110.964	50	0.000
3	3.11950	11.42	.325		0.8941	49.934	24	0.001

REMAINING COMPUTATIONS WILL BE BASED ON 3 DISCRIMINANT FUNCTION(S)

## STANDARDIZED DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2	FUNC 3
VAR01	-0.03535	-0.19022	-0.41448
VAR02	-0.17995	-0.12893	0.12431
VAR03	0.16001	0.36594	-0.40720
VAR06	-0.11896	0.33996	0.12240
VAR07	0.02330	-0.40431	-0.19011
VAR09	0.18339	0.02322	-0.02164
VAR00	-0.09912	-0.27977	0.27520
VAR011	-0.06535	0.14279	0.38374
VAR012	0.13917	-0.23012	-0.15875
VAR016	-0.19275	-0.19910	-0.32388
VAR017	0.01130	0.40883	0.05594
VAR018	-0.17535	-0.12963	-0.34679
VAR019	0.04149	-0.27046	0.31842
VARJ20	0.03734	-0.23341	0.25931
VAR023	-0.08752	0.12655	0.46076
VAR030	-0.16187	0.35893	-0.23659
VARJ31	0.11121	-0.38438	-0.17805
VAR033	-0.14625	-0.13775	0.22534
VAR037	0.16533	0.21515	0.31321
VAR0-J	-0.21546	0.06570	-0.23728
VAR129	0.14642	-0.12438	-0.06136
VAR130	0.15239	-0.15964	-0.19023
VAR131	0.03732	0.32729	-0.23048
VAR133	0.51031	-0.31319	0.05469
VAR136	-0.08854	-0.02531	-0.21246
VAR137	0.17921	0.11926	-0.10111

## CENTROIDS OF GROUPS IN REDUCED SPACE

	FUNC 1	FUNC 2	FUNC 3
GROUP 1	0.81232	-0.00981	-0.18031
GROUP 2	-0.15933	0.61839	0.45975
GROUP 3	-0.84734	-0.45075	-0.31973
GROUP 4	-0.33752	1.03348	-0.37551

## PREDICTION RESULTS -

ACTUAL GROUP	NO. OF CASES	PREDICTED GROUP MEMBERSHIP			GF.
		GP.	1	GF.	
GROUP 1	163*	86.4%	11.7%	19*	5*
GROUP 2	174*	42*	74*	32*	3.1%
GROUP 3	85*	10.6%	42.5%	42.5%	26*
GROUP 4	39*	2*	13*	47*	14.9%
		5.1%	15.3%	55.3%	16*
				5*	18.8%
				26*	
				66.7%	

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED 60.30%

TAB 2 REFINEMENT OF THE VARIABLE LIST

VARIABLES - 085-126 plus 128-131, 133, 136, and 137

METHOD - Discriminant Analysis/MAXMINF

## AMENDED CIVILIAN NURSE RETENTION

FILE NO.: A111 (COMPUTATION DATE = 05/14/92)

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STRUCTURE TABLE

STEP NUMBER	VARIABLE ADDED (REMOVED)	F TO ENTER OR REMOVE	NUMBER INCLUDED	WILKS' LA. F.A.	FACETS V	CHANGE IN RATIO'S V	SIG. CF CHANGE
1	VAS13	65.79125	1	0.77674	0.000	131.35291	0.000
2	VAS11	3.92773	2	0.75718	0.009	143.50313	12.15011
3	VAS12	3.56543	3	0.73975	0.009	154.64404	11.14101
4	VAS13	1.55565	4	0.77225	0.009	159.43569	4.79156
5	VAS137	7.41602	5	0.59797	0.009	187.75236	28.31676
6	VAS13	3.3391	6	0.69286	0.009	199.05229	12.26957
7	VAS12	0.03125	7	0.56074	0.009	219.00624	19.95395
8	VAS11	1.97705	8	0.65215	0.009	225.76951	6.76227
9	VAS134	1.44322	9	0.64549	0.009	231.72511	5.95560
10	VAS139	1.46324	10	0.63950	0.009	236.64617	4.92105
11	VAS101	1.10547	11	0.53449	0.056	246.27093	3.62482
12	VAS128	2.21034	12	0.62558	0.009	248.56184	3.29.85
13	VAS124	0.99027	11	0.62979	0.000	245.18472	3.37713
14	VAS143	3.75135	12	0.61628	0.000	258.56761	13.36290
15	VAS103	0.95752	14	0.61824	0.009	255.44132	3.16269
16	VAS134	0.57231	12	0.60975	0.000	262.79041	7.34.508
17	VAS102	0.60135	13	0.60233	0.000	269.22774	6.43733
18	VAS122	1.83019	14	0.59467	0.002	276.71436	6.48723
19	VAS124	0.55459	15	0.62029	0.000	313.95374	0.004
20	VAS125	1.27535	16	0.56726	0.000	319.27683	3.16.0
21	VAS131	1.71633	17	0.56093	0.009	325.20965	5.93293
22	VAS12	1.46532	18	0.54438	0.002	330.65431	5.44435
23	VAS138	1.91504	19	0.53937	0.000	337.69030	0.0371
24	VAS105	1.48632	20	0.53230	0.000	343.04559	0.150
25	VAS130	1.07656	21	0.52839	0.000	348.19803	0.158

DISCRIMINANT FUNCTION	EIGENVALUE	RELATIVE PERCENTAGE	CORRELATION	CANONICAL FUNCTION DERIVED	MILKS' LAMEDA	CHI-SQUARE	DF	SIGNIFICANCE
1	1.55339	72.71	0.597	0	0.5291	284.959	63	0.000
2	0.15167	13.91	0.363	1	0.9223	87.693	40	0.000
3	0.05628	7.33	1.231	2	0.9467	24.501	19	0.178

DETAILED COMPUTATIONS WILL BE BASED ON 3 DISCRIMINANT FUNCTIONS

## STATISTICAL DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2	FUNC 3
VAR 1	-0.31432	0.24969	-0.26917
VAR 2	-0.12375	-0.5+3.9	-0.1)E-4
VAR 3	0.17480	0.637+3	2.5+3.8
VAR 4	0.37910	-0.23115	-2.5)722
VAR 5	-0.41436	0.4+7.5	-0.33411
VAR 6	0.32157	0.23524	0.447.1
VAR 7	0.32744	-0.59394	-0.41911
VAR 8	-0.16776	-0.14650	0.5+375
VAR 9	-0.01+2.4	-0.45239	-0.02123
VAR 10	0.032+9	0.+4.25+	-0.16388
VAR 11	0.13536	-0.41563	0.47116
VAR 12	-0.24554	-0.90533	0.57155
VAR 13	0.127+5	0.45309	2.613+2
VAR 14	-0.13493	0.32193	-0.93499
VAR 15	-0.12529	0.13542	0.01257
VAR 16	-0.23244	-0.17041	-0.31852
VAR 17	-0.19316	-0.05554	2.07238
VAR 18	-0.19545	0.01215	-0.6134
VAR 19	-0.33346	0.31611	-2.25333
VAR 20	-0.64335	-0.127+0	0.23664
VAR 21	-0.31436	0.327+0	0.29279

SELECTED COEFFICIENTS IN ANALYSIS

	FUNC 1	FUNC 2	FUNC 3
GRC14	-0.75342	0.11793	-0.37333
GRC15	2	0.22250	-0.13150
GRC16	2	0.56033	-0.31753
GRC17	4	0.31604	1.05440

APPENDIX D  
DISCRIMINANT ANALYSIS - COMPARISON OF METHODS

## DISCRIMINANT ANALYSIS - COMPARISON OF METHODS

The SPSS version available offered the same methods of discriminant analysis as described in the SPSS user manual: direct, Wilks, MAHAL, MAXMINF, MINRESID, and RAO (the latter five incorporating stepwise selection criteria). For an explanation of each method, the reader is referred to the SPSS user manual, pages 446 - 448. A comparison of the different methods was made using data from this survey. There was essentially no difference in the results obtained by the different stepwise methods.

APPENDIX E  
DISCRIMINANT ANALYSIS -  
COMPARISON OF MISSING DATA OPTIONS

## DISCRIMINANT ANALYSIS - COMPARISON OF MISSING DATA OPTIONS

The SPSS version available offered the same two options as described in the SPSS user manual for handling missing data during the analysis:

Option 1 - Include missing data

Option 2 - Include cases with missing values during classification.

For an explanation of the options the reader is referred to the SPSS user manual, page 456. A comparison of the two options for handling missing data was made using data from this survey (Tabs 1 and 2). Option 1 produced the better results. There did not appear to be any contraindication for using Option 1; therefore, it was incorporated into the series of analyses of the final variables list.

## TAB 1 - OPTIONS COMPARISON

### Option 1 - Include missing data

"With this option all missing-value declarations are ignored. In this instance, all cases are included during the stepwise and analysis phases provided that they satisfy the GROUPS specification. During the classification phase, all cases are included regardless of their group assignment."

SPSS Manual, page 456

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FILE: 7-100001 (CREATION DATE = 05/13/92)

CREATION DATE = 05/13/921

E = 05/13/921

RECENTS: DAT

Ergonomics 2020, 13, 10

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STATE	VARIABLE	ENTERED	NUMBER INCLUDED	WILKS' LAMBDA	SIG.
INTERV	RELEV	INTV	INCLUDED		
1	VAR133	*3 *78425	1	0.77674	131.35291
2	VAR019	5 *81463	2	0.74816	150.30244
3	VARJ31	5 *62102	3	0.73227	160.56373
4	VARJ24	4 *19345	4	0.71255	175.45487
5	VAR026	4 *55274	5	0.66170	162.20401
6	VARJ35	2 *94727	6	0.60542	214.74049
7	VAR237	2 *30459	7	0.65536	222.71935
8	VARJ17	2 *55273	8	0.64439	231.91734
9	VAR091	4 *55459	9	0.62535	248.43631
10	VARJ12	1 *62503	11	0.61862	253.93847
11	VARJ06	2 *10156	11	0.61031	262.32070
12		0 *64503	19	0.61266	260.09745
13	VAR010	2 *16912	11	0.60386	267.80083
14	VARJJ7	1 *54492	12	0.59765	273.51447
15	VAR033	2 *62349	15	0.58724	282.14681
16	VARJ37	*89344	14	0.56842	303.32230
17	VAR128	1 *72627	15	0.56195	310.02427
18	VARJJ2	3 *34496	16	0.54941	324.97488
19	VARP534	1 *64355	17	0.54334	331.48988
20	VARJ33	3 *91504	19	0.52921	348.50414
21	VARJ11	1 *15357	19	0.52535	352.49591
22	VAR131	3 *14553	20	0.49731	367.92004
23	VAR124	3 *46337	21	0.48576	405.16437
24	VARJ16	3 *24023	22	0.47516	419.32213
25	VARJ22	1 *21729	23	0.47120	425.53191
26	VAR018	2 *72656	24	0.46249	438.32049
27		2 *38599	27	0.46512	433.92369
28	VAR222	2 *25791	24	0.45917	442.35174
29	VAR123	3 *34935	23	0.45119	478.62130
30	VAR130	1 *27781	24	0.45714	444.73216
31	VAR040	3 *13373	25	0.44742	460.04893
32	VAR359	2 *06152	26	0.44111	471.34644
33	VARC34	3 *94459	25	0.44400	467.88431
34	VARP136	1 *35599	26	0.43936	474.012153

WILKS' FUNCTIONS AND CHI-SQUARE

SIGNIFICANCE

0.77171	74.38	0.4397	365.481	78
0.14725	14.19	1	0.7793	50
		2	0.8941	24
			49.834	
				0.001

REMAINING COMPUTATIONS WILL BE BASED ON 3 DISCRIMINANT FUNCTION(S)

## STANDARDIZED DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2	FUNC 3
VAR001	-0.08535	-0.19022	-0.41448
VAR002	-0.17395	-0.12893	0.12471
VAR003	0.16001	0.36534	-0.40720
VAR006	-0.11396	0.33396	0.12240
VAR007	0.02330	-0.40441	-0.19011
VAR009	0.18339	0.02322	-0.02164
VAR010	-0.09914	-0.27977	0.27520
VAR011	-0.08535	0.14279	0.38374
VAR012	0.13917	-0.23012	-0.15875
VARC16	-0.19275	-0.15910	-0.32388
VARC17	0.01130	0.40883	0.05584
VARQ18	-0.17533	-0.12953	-0.3679
VARQ19	0.04144	-0.27046	0.31042
VARQ20	0.03724	-0.23341	0.26941
VARU23	-0.08752	0.12655	0.46076
VARU30	-0.16187	0.33893	-0.29659
VARU31	0.11121	-0.38438	-0.17805
VARC33	-0.14625	-0.13775	0.22534
VAR037	0.15593	0.21515	0.31321
VAR040	-0.21246	0.06570	-0.23728
VAR129	0.14642	-0.12434	-0.06136
VAR130	0.15299	-0.15964	-0.19023
VAR131	0.03732	0.32729	-0.23048
VAR133	0.51001	-0.31319	0.25469
VAR135	-0.38354	-0.02391	-0.21246
VAR137	0.17921	0.11926	-0.10111

## CENTROIDS OF GROUPS IN REDUCED SPACE

	FUNC 1	FUNC 2	FUNC 3
GROUP 1	0.01232	-0.00381	-0.18031
GROUP 2	-0.15930	0.01899	0.43975
GROUP 3	-0.84754	-0.45075	-0.31973
GROUP 4	-0.33761	1.03438	-0.37561

## ANALYSIS RESULTS -

ANALYSIS GROUP	NO. OF CASES	PREDICTED GROUP MEMBERSHIP			
		GF.	1 G.P.	2 CP.	3 GF.
1	163.	131.	19.	9.	5.
		45.4%	11.7%	4.9%	3.1%
2	174.	42.	74.	32.	26.
		24.1%	42.5%	18.4%	14.9%
3	85.	3.	13.	47.	16.
		10.6%	15.3%	55.3%	18.8%
4	32.	2.	6.	5.	26.
		5.6%	15.4%	12.9%	56.7%

PERCENT OF CORRECTLY CLASSIFIED CASES

60.30%

TAB 2 - OPTIONS COMPARISON

Option 2 - Include cases with missing values during classification

"During the classification phase, all cases with missing data are processed. If the group code is missing, the case is treated as unclassified. If data are missing from the discriminating variable, the total mean for the respective variable is submitted."

SPSS Manual, page 456

## DISCRIMINANT ANALYSIS

STEP NO.	VARIABLE ENTERED OR REMOVED	F TO ENTER OR REMOVE	NUMBER INCLUDED	WILKS' LAMBDA	SIG.	RAC'S V	CHANGE IN RAO'S V	SIG. OF CHANGE
1	VAR015	13.55853	1	0.90352	0.000	40.568304	40.568304	0.000
2	VAR019	4.19322	2	0.84859	0.000	66.74654	26.063364	0.000
3	VAR153	51.05459	3	0.61113	0.000	169.27915	102.533462	0.000
4	VAR012	3.79320	4	0.66127	0.000	1F3.01430	13.74435	0.003
5	VAR127	2.23320	5	0.61047	0.000	191.40585	8.39155	0.039
6	VAR112	1.66113	6	0.64037	0.000	196.87341	5.46756	0.141
7	VAR113	2.50596	7	0.67045	0.000	204.64719	7.77378	0.051
8	VAR035	1.20410	8	0.62492	0.000	208.97548	4.32829	0.228
9	VAR031	3.04492	9	0.63988	0.000	220.26459	11.28911	0.010
10	VAR030	2.57310	10	0.59745	0.000	230.25107	9.98648	0.019
11	VAR007	1.31494	11	0.59116	0.000	234.94297	4.69190	0.196
12	VAR037	1.29546	12	0.53503	0.000	240.13597	5.19299	0.158
13	VAR020	1.51732	13	0.57795	0.010	245.40735	5.27133	0.153
14	VAR007	0.32104	12	0.59140	0.000	242.39153	-3.71562	1.000
15	VAR041	1.30371	13	0.57570	0.000	248.10389	5.71237	0.126
16	VAR003	1.46324	14	0.56696	0.000	253.222601	5.12271	0.163
17	VAR035	1.13135	15	0.56367	0.000	258.258501	5.03190	0.169
18	VAR033	3.41602	16	0.54431	0.010	271.02597	13.56747	0.004
19	VAR035	1.97754	15	0.55271	0.000	267.47320	-4.35277	1.000
20	VAR009	1.82031	16	0.54558	0.000	275.94442	8.47522	0.037
21	VAR135	2.23956	17	0.53913	0.000	291.56196	5.61354	0.132
22	VAR129	7.79594	13	0.50657	0.000	316.67618	35.11423	0.000
23	VAR013	0.83333	17	0.51005	0.000	313.03340	-3.64279	1.000
24	VAR130	1.36316	18	0.50436	0.000	318.94357	5.91017	0.116
25	VAR041	1.95142	17	0.52832	0.000	314.43949	-4.50404	1.000
26	VAR137	4.68164	18	0.48943	0.000	337.74665	23.30717	0.000
27	VAR001	0.94312	17	0.49323	0.000	333.30563	-4.44102	1.000
28	VAR002	2.93936	18	0.48547	0.000	343.33077	10.02513	0.019
29	VAR035	3.05964	17	0.48891	0.000	339.49137	-3.83940	1.000
30	VAR045	2.44973	18	0.47771	0.000	353.33103	13.88567	0.003
31	VAR016	1.15527	19	0.47319	0.000	359.37103	5.99000	0.112
32	VAR023	1.19010	20	0.46891	0.000	363.33867	3.96764	0.265

DISCRIMINANT FUNCTION	EIGENVALUE	RELATIVE PERCENTAGE	CANONICAL CORRELATION	FUNCTIONS DERIVED	WILKS' LAMEDA	CHI-SQUARE	DF	SIGNIFICANCE
1	0.71516	77.18	2.651	0	0.4689	281.729	60	0.000
2	0.14532	15.41	0.358	1	0.8135	76.742	38	0.000
3	0.07157	7.52	0.259	2	0.9331	25.749	16	0.106

COMPUTATIONS WILL BE BASED ON 3 DISCRIMINANT FUNCTION

## STAN ALPHABETIC DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2	FUNC 3
VARJ12	J.16636	5.05495	0.08187
VARJ13	-0.19705	-0.30119	-0.47413
VARJ14	J.19162	-J.294+3	0.06118
VARJ15	-J.07114	0.41713	J.00338
VARJ16	J.19704	-J.05721	-0.13512
VARJ17	0.07439	-0.26252	0.03888
VARJ18	J.12174	0.14357	-0.34576
VARJ19	J.00956	0.45030	0.26935
VARJ20	0.00251	0.37176	0.14768
VARJ21	0.0+742	-J.01746	0.4722
VARJ22	J.06627	-J.36789	-0.39919
VARJ23	-0.15500	0.29551	-0.23311
VARJ24	0.17323	0.2306	0.23571
VARJ25	-J.011714	-J.01172	J.3+066
VARJ26	5.16541	-0.02166	-J.29266
VARJ27	0.11943	5.266+1	-J.27634
VARJ28	-0.19700	0.22461	-0.0+873
VARJ29	J.16367	-0.13761	-0.32651
VARJ30	-J.51025	0.24236	0.016+6
VARJ31	-J.21058	-J.05540	-J.15024

## CENTROIDS OF GROUPS IN REDUCED SPACE

	FUNC 1	FUNC 2	FUNC 3
GROUP 1	-J.82099	-0.01232	-C.13586
GROUP 2	0.17743	J.03227	0.32013
GROUP 3	J.86396	0.46397	-0.30337
GROUP 4	J.8J357	-J.97176	-J.22751

APPENDIX F  
DISCRIMINANT ANALYSIS - PARTIAL F OF 1.5

## A4E05 CIVILIAN NUKE RETENTION

FILE NODNAME (CREATION DATE = 05/17/82)

05/17/82 PAGE 5

## SUMMARY TABLE

STEP NUMBER	VARIABLE ENTERED	VARIABLE REMOVED	F TO ENTER OR REMOVE	NUMBER INCLUDED	WILKS' LAMBDA	SIG.	FAO'S V	CHANGE IN FAO'S V	SIG. OF CHANGE
1	VAP017		3.37391	1	0.94785	0.000	25.14618	25.14616	0.000
2	VAP120		7.62031	2	0.96146	0.000	4.8.80992	23.66384	0.000
3	VAR146		13.14453	3	0.32955	0.000	91.04599	42.23597	0.000
4	VAP193		3.70312	4	0.80973	0.000	103.11331	12.06603	0.007
5	VAP162		2.66695	5	0.79566	0.000	111.58879	8.4788	0.037
6	VAP113		2.49219	6	0.79271	0.000	119.72775	8.13596	0.043
7	VAP119		2.94629	7	0.76766	0.000	129.38167	9.65892	0.022
8	VAP031		3.14355	8	0.75190	0.000	139.44181	10.56614	0.016
9	VAP346		5.90339	9	0.72338	0.000	160.65553	21.21373	0.000
10	VAP023		1.19727	10	0.71763	0.000	164.43311	3.77758	0.287
11	VAP113		1.93457	11	0.70843	0.000	171.10311	6.57000	0.063
12	VAP120		2.37312	12	0.69731	0.000	176.63464	7.58152	0.056
13	VAP166		3.34082	13	0.68195	0.000	190.00170	11.31706	0.010
14	VAP113		3.87394	14	0.68599	0.000	186.80580	-3.19590	1.000
15	VAP119		1.78809	15	0.67782	0.000	192.66876	5.86296	0.116
16	VAP136		1.16162	16	0.67254	0.000	196.50420	3.53544	0.260
17	VAP116		2.88379	17	0.65965	0.000	207.05185	10.54765	0.014
18	VAP102		2.59961	18	0.64822	0.000	216.67161	9.311976	0.229
19	VAP137		6.29492	19	0.62159	0.000	246.33538	24.26347	0.000
20	VAP105		1.34131	20	0.61596	0.000	245.12615	4.79107	0.108
21	VAP137		5.42573	21	0.59393	0.000	266.25565	21.12950	0.000
22	VAP106		4.67573	22	0.58719	0.000	272.23357	5.97792	0.113
23	VAP010		1.73975	23	0.58026	0.000	279.90196	6.66839	0.083
24	VAP135		2.98828	24	0.56856	0.000	291.07030	12.16834	0.067
25	VAP138		14.9.87500	25	0.27955	0.000	847.90033	556.8302	0.000
26	VAP117		1.92798	26	0.26134	0.000	843.5149	-4.35883	1.000
27	VAP110		0.95874	27	0.28319	0.000	836.95664	-4.58485	1.000
28	VAP122		1.79541	28	0.27974	0.000	846.65812	7.70149	0.053
29	VAP149		1.56494	29	0.27675	0.000	854.91524	8.25710	0.041
30	JAP094		1.53320	30	0.27335	0.000	860.79114	5.87590	0.118
31	VAP113		1.30957	31	0.27138	0.000	866.62854	5.83741	0.121
32	VAP121		1.18403	32	0.26917	0.000	872.99112	6.36277	0.095
33	VAP102		1.65845	33	0.27040	0.000	869.20035	-3.79096	1.000
34	VAP002		1.01025	34	0.26852	0.000	873.52366	4.33633	0.227
35	VAP001		3.23437	35	0.26260	0.000	868.95691	15.4222	0.001
36	VAP002		1.96338	36	0.26436	0.000	894.82444	-4.13247	1.000
37	VAP133		3.45215	37	0.25816	0.000	901.51066	16.08622	0.001
38	VAP104		2.67697	38	0.25344	0.000	913.45413	11.94347	0.008
39	VAP200		0.77295	39	0.25481	0.000	907.81435	-5.54117	1.000
40	VAP107		1.11377	40	0.25284	0.000	914.17574	6.36171	0.095
41	VAP102		1.32491	41	0.25104	0.000	918.76224	4.58651	0.205
42	VAP007		0.96022	42	0.25276	0.000	912.95348	-5.80877	1.000
43	VAP131		1.25732	43	0.25056	0.000	921.17116	8.21768	0.042
44	VAP052		0.95459	44	0.25223	0.000	916.96538	-4.20578	1.000

## AMERICAN CIVILIAN NURSE RETENTION

	VARIANCE	EIGENVALUE	RELATIVE PERCENTAGE	CANONICAL CORRELATION	FUNCTIONS DERIVED	WILKS' LAMBDA	CHI-SQUARE	DF	SIGNIFICANCE
1	3.61916	29	6.1916	0.24601	0.000	944.44452	27.47914	0.000	
2	1.19922	30	1.1992	0.24396	0.000	953.67328	9.22876	0.025	
3	1.67871	31	1.6787	0.24111	0.000	967.01064	13.33736	0.044	
4	1.48396	32	1.4839	0.23862	0.000	974.51243	7.50179	0.058	
5	VAPLCC								

DISCRIMINANT COMPUTATIONS WERE BASED ON 3 DISCRIMINANT FUNCTION(S)

## STANDARDIZED DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2	FUNC 3	
VAR01	-0.06235	-0.19692	-0.31650	Salary - P
VAR02	0.10347	0.30737	-0.25520	Working Cond - P
VAR03	-0.06831	0.13664	-0.05729	Relations w/ Supervisor - P
VAR04	-0.10452	-0.14971	0.26774	Work Performed - P
VAR05	0.09429	-0.36194	-0.22857	Overall Job Satisfaction - P
VAR06	-0.02662	-0.20555	-0.31718	Goal Conformance - P
VAR07	-0.05340	-0.11916	0.30512	Benefits - P
VAR08	-0.10145	0.01543	0.08396	Training Opp - P
VAR09*	-0.00163	0.03545	0.37255	Organization Communication - P
VAR010	0.12142	-0.13346	-0.05733	Spt. of Personal Goals - P
VAR011	-0.13637	0.00159	-0.32222	Performance Eval's - P
VAR012	0.05913	-0.21929	0.21242	Equip/Facilities - P
VAR013	-0.00911	0.34672	0.26281	Admin Work Read - P
VAR014	0.15146	-0.28377	-0.17931	Time Off - P
VAR015	0.19089	-0.23493	0.09354	Salary - A
VAR016	-0.21437	-0.05937	0.00639	Responsibility - A
VAR017	0.21252	-0.00198	0.39184	Relations w/ Supervisor - A
VAR018	0.02923	-0.19513	-0.39439	Work Performed - A
VAR019	0.07448	0.23150	-0.29132	Overall Job Satisfaction - A
VAR020	-0.10846	0.04356	0.29731	Perceptions of Significant Other - A
VAR021	0.10839	0.22552	-0.32092	Benefits - A
VAR022	-0.06654	-0.30359	0.45426	Training Opportunities - A
VAR023	-0.15090	-0.17839	-0.09718	Continuity of Rx - A
VAR024	0.13930	0.12374	-0.02212	Collaboration (MD/Nurse) - A
VAR025*	0.00326	-0.18541	0.31890	Co-Workers - A
VAR026	-0.22954	0.15314	0.13444	Starting Salary - A
VAR027*	-0.03062	-0.14033	0.52520	Retirement Program - A
VAR028	0.03028	0.11445	-0.70973	Personal Security - A
VAR029	0.00059	0.30152	-0.12753	Uniform Policy - A
VAR030*	0.06055	-0.02655	-0.20467	Rotating Shifts
VAR031	-0.04923	0.26333	-0.12726	Success in Locating Other Job
VAR032	0.87976	0.16457	0.03039	
VAR033	* Var not sig until FUN 3			

## CENTROIDS OF GROUPS IN REDUCED SPACE

	FUNC 1	FUNC 2	FUNC 3
GROUP 1	-0.30260	0.61398	-0.23298
GROUP 2	-0.20153	-0.43208	0.42475
GROUP 3	-0.18081	-0.95742	-0.40731
GROUP 4	2.05571	0.10985	-0.02936

## PREDICTION RESULTS -

ACTUAL GROUP	NO. OF CASES	PREDICTED SP.	GROUP 1	GROUP 2	MEMBERSHIP	GP.	3	GF.	4
GROUP 1	253*	115*	71.6%	34*	13*	9.3%	1*	0.6%	
GROUP 2	174*	44*	25.3%	94*	43*	24.7%	3*	1.7%	
GROUP 3	85*	9*	10.6%	15*	59*	69.4%	2*	2.4%	
GROUP 4	39*	3*	7.7%	5*	1*	2.6%	36*	76.9%	
UNGROUPED CASES	3*	44.4%	11.1%	2*	22.2%	2*	22.2%		

PERCENT OF GROUPED CASES CORRECTLY CLASSIFIED 62.47%

APPENDIX G  
DISCRIMINANT ANALYSIS - PARTIAL F OF 2.0

FILE NUMBER E3114 DATE 03/03/2012

FILE NUMBER E3114 DATE 05/30/2012

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STUDY OF THE VARIOUS ELEMENTS OF THE EARTH'S MAGNETIC FIELD

SIG. OF  
CHANGE IN  
RAC'S V  
FAC'S V

VAP0017	2.0	7.729 C1
VAP0225	7.0	8.202 C1
VAP0116	4.3	1.445 C2
VAP0077	7.0	7.031 C2
VAP0033	2.0	6.690 C5
VAP0113	2.0	4.921 C9
VAPC19	2.0	0.462 C0
VAP071	2.0	1.435 E
VAPC40	2.0	0.003 C0
VAP072	2.0	4.775 C0
VAPC46	3.0	7.558 C6
VAP037	5.0	0.214 C8
VAP120	1.0	4.140 C6
VAPR119	7.0	1.131 C4
VAPR085	1.0	0.861 C3
VAPR37	1.0	1.925 C9
VAP122	3.0	7.722 C0
VAPR115	1.0	1.303 C7
VAPR116	1.0	9.976 C6
VAPC1A	2.0	0.722 C7
VCR037	2.0	3.400 C0
VAPC94	2.0	4.912 C1
VAPR119	2.0	1.959 C4
VAPR122	2.0	1.772 C6
VAPC01	2.0	6.084 C0
VAPR104	2.0	1.749 C2
VAPR020	2.0	3.947 C7
VAPR108	2.0	0.033 C0
VAPC30	2.0	1.492 C9
VAP113	2.0	4.441 C1
VAPR002	3.0	9.963 C7
VAPR105	1.0	1.890 C4
VAPC20	2.0	4.030 C1

3.30	25.14619	25.14619
0.050	48.90992	23.66394
0.050	91.04599	42.23527
0.050	103.11391	12.06803
0.050	141.58079	8.47465
0.050	119.72275	8.12396
0.050	129.36167	9.65892
0.050	139.44181	10.06014
0.050	160.65553	21.21373
0.050	169.77469	9.11855
0.050	162.34665	12.56676
0.050	201.55029	19.21945
0.050	196.05174	-5.49655
0.050	216.37286	10.32121
0.050	212.50542	6.13256
0.050	224.53529	12.42997
0.050	239.19856	14.26327
0.050	234.63003	-4.56854
0.050	269.92871	35.29869
0.050	282.15412	12.22540
0.050	295.45140	13.29728
0.050	305.20823	9.75663
0.050	312.44771	7.23948
0.050	319.97473	7.52702
0.050	330.23636	10.26163
0.050	337.08835	6.85199
0.050	331.97429	-5.11406
0.050	339.55404	7.57975
0.050	347.64614	8.09202
0.050	342.29627	-5.34977
0.050	349.44803	7.15175
0.050	356.58001	7.23199
0.050	366.26625	9.60624

	WILKS' LAMBDA	CHI-SQUARE	DF	SIGNIFICANCE
INCTIONS DERIVED	.999	0.000	0	1.000

1	0.45917	57.16
2	0.26497	70.56
3	0.16944	12.28

0	11.5015	307.451	12	0.0000
1	0.7313	135.426	46	0.6000
2	0.9104	41.827	23	0.0100

## STANDARDIZED DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2	FUNC 3	
VA2301	0.16602	0.04212	-0.33778	Current Salary
VA2302	0.07829	0.23278	0.15991	Responsibility
VA2303	-0.71936	-0.39235	-0.29134	Working Conditions
VA2304	0.39037	-0.05669	-0.28009	Job Satisfaction - Overall
VA2305	0.07646	-0.29016	0.32735	Significant Other Perception of Job
VA2306	0.21057	0.15202	-0.29238	Goal Congruence
VA2307	0.05729	0.27952	0.26715	Benefits
VA2308	-0.11256	0.31026	0.10741	Training Opportunities
VA2309	0.22174	-0.30417	0.04777	Support re: Personal Goals
VA2310	-0.15481	0.37650	-0.38992	Performance Evaluations
VA2311	0.24427	0.32343	0.32392	Equipment/Facilities
VA2312	-0.31937	-0.09670	0.37439	Administrative Work Requirements
VA2313	0.30499	-0.09301	-0.14697	Time Off
VA2314	0.26962	-0.42365	0.05934	Current Salary
VA2315	-0.18423	0.51894	-0.01798	Responsibility
VA2316	0.06771	-0.65742	0.41355	Supervisor Relations
VA2317	0.14516	0.25477	-0.27567	Work Performed
VA2318	0.20297	-0.05433	0.42943	Training Opportunities
VA2319	-0.12904	0.41134	-0.39355	Continuity of Patient Care
VA2320	0.09492	-0.45959	-0.02713	Collaboration - MD/RN
VA2321	0.16757	0.13471	0.34912	Co-Workers
VA2322	-0.31470	0.75194	0.32924	Starting Salary
VA2323	-0.07147	-1.24431	-0.80259	Personal Security
VA2324	-0.12235	-0.13203	-0.15057	Uniform Policies
VA2325	-0.19017	-0.17045	-0.15211	Anticipated Satisfaction

## CENTROIDS OF GROUPS IN REDUCED SPACE

	FUNC 1	FUNC 2	FUNC 3	
Group 1	-0.63973	-0.04660	-0.24475	
Group 2	0.63481	0.12011	0.37494	
Group 3	0.97294	0.45778	-0.32709	
Group 4	1.72094	-1.33893	-0.96235	

RESULTS

ANTIQUE GROUP	NO. OF CASES	PREDICTED GROUP MEMBERSHIP
1	682	1

PREDICTED GROUP MEMBERSHIP  
GP. 1 GP. 2 GP. 3 GP. 4

SCIENCE CLASSESS COFFEECLY CLASSESS 54.95\$

APPENDIX H  
DISCRIMINANT ANALYSIS - PARTIAL F OF 3.0

## AMEDD CIVILIAN NURSE RETENTION

FILE NONAME (CREATION DATE = 06/04/92)

06/04/92

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## SUMMARY TABLE

DISCRIMINANT FUNCTION	EIGENVALUE	RELATIVE PERCENTAGE	CANONICAL CORRELATION	FUNCTIONS DERIVED	WILKS' LAMBDA	CHI-SQUARE	DF	SIGNIFICANCE
1	0.31555	66.09	0.490	0	0.6520	193.540	33	0.000
2	0.13199	27.64	0.341	1	0.8577	69.441	20	0.000
3	0.02992	6.27	0.170	2	0.9709	13.341	9	0.148

REMAINING COMPUTATIONS WILL BE BASED ON 3 DISCRIMINANT FUNCTION(S)

## STANDARDIZED DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1	FUNC 2	FUNC 3
VAR016	0.46976	0.04596	-0.28013
VAR017	0.02886	0.53151	0.22300
VAR018	0.32590	-0.04626	-0.40111
VAR019	0.09245	-0.41300	0.50398
VAR021	-0.10167	-0.44564	-0.45058
VAR037	-0.35893	0.21339	0.36238
VAR040	0.37527	0.04043	-0.07308
VAR046	0.09706	-0.48526	0.04908
VAR053	0.18179	0.84926	0.25728
VAR118	-0.08402	-0.59993	0.42482
VAR137	-0.33726	0.01402	-0.22944

## CENTROIDS OF GROUPS IN REDUCED SPACE

	FUNC 1	FUNC 2	FUNC 3
GROUP 1	-0.52362	-0.03221	-0.13975
GROUP 2	-0.02374	-0.00506	0.21850
GROUP 3	0.78165	-0.39406	-0.12466
GROUP 4	0.59080	1.01607	-0.11903

VAR016	Job Satisfaction - Overall
VAR017	Significant Other Perception of Job
VAR018	Goal Congruence
VAR019	Benefits
VAR021	Performance Evaluations
VAR037	Administrative Work Requirements
VAR040	Time Off
VAR046	Responsibility
VAR053	Supervisor Relations
VAR118	Starting Salary
VAR137	Anticipated Satisfaction

{ Person, J. S.

{ Alternative, S. I.

## PREDICTION RESULTS -

ACTUAL GROUP		NO. OF CASES	PREDICTED GROUP MEMBERSHIP			
GROUP	1		GP. 1	GP. 2	GP. 3	GP. 4
GROUP 1	163.	95.	58.3%	30%	18.	20.
GROUP 2	174.	56.	50%	40%	11.0%	12.3%
GROUP 3	85.	32.2%	28.7%	23.0%	28.	16.1%
GROUP 4	39.	9.	12%	56%	8%	9.4%
		10.6%	14.1%	65.9%		
		20.5%	4%	5%	22%	
			10.3%	12.8%	56.4%	

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED 48.37%

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